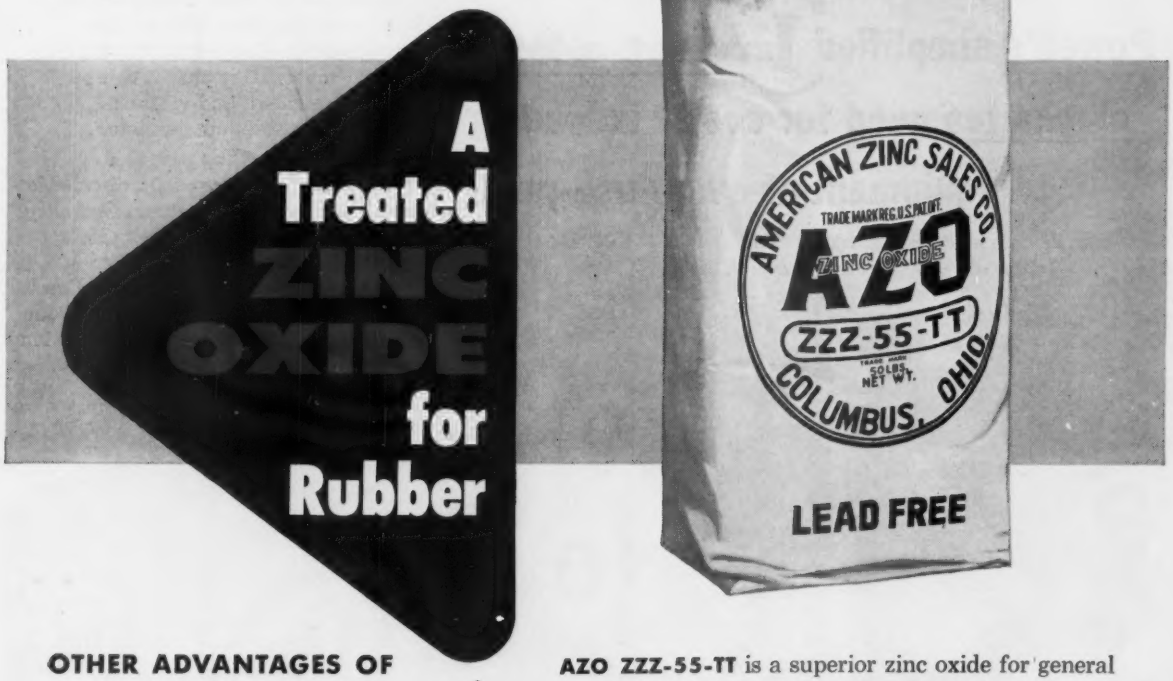
You get safe, easy processing, with excellent physical properties and good aging when you use

AZO ZZZ-55-TT



OTHER ADVANTAGES OF AZO ZZZ-55-TT

Rapid incorporation
Increased dispersion
Faster curing
Safe processing
Improved scorch resistance
Lower acidity
High apparent density
Low moisture absorption
High tensile strength
Increased tear resistance

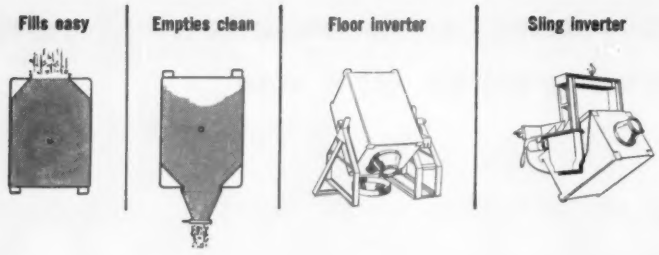
NOTE:
AZO rubber grade zinc oxides are also available as AZODOX (de-aerated). AZODOX has twice the apparent density, half the dry bulk.

AZO ZZZ-55-TT is a superior zinc oxide for general use in rubber, heat treated in a controlled atmosphere, and also treated chemically to improve its physical properties and features. It can be used to advantage at activation levels in stocks mixed on the open mill, and at reinforcing levels in highly loaded Banbury stocks and masterbatches.

If you have been considering the use of a treated zinc oxide, may we suggest that you test AZO ZZZ-55-TT in your most exacting recipes. Samples on request.

American Zinc sales company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY
COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK



Powell's simplified Invert-a-bin® eliminates need for costly unloading equipment at every use-point

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Invert-a-bin® ideal for in-plant or inter-plant handling. Fills easily—empties clean. Can handle the most difficult materials in that it can be tumbled, aerated, and vibrated. Available in steel and aluminum.

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

MARCH, 1960 VOL. 86, NO. 6

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In This Issue

1009 **Compounding Transparent Rubber**—By Ralph F. Wolf and C. C. Stueber
Silica loaded butyl rubber compounds have been developed with such good transparency that they may find an important use in tire manufacturing.

1017 **Attrited Carbon Blacks and Their Behavior in Elastomers. Part I: The Attrition Process and Its Effect on Carbon Blacks**—By A.M. Gessler
Chemical and physical changes caused by ball milling of carbon black are so profound that they suggest a breakthrough in a much broader area.

1025 **Systematic Control of Rubber-to-Metal Adhesion in the Wire and Cable Industry**—By Richard P. Stout
Successful rubber bonding depends on proper control of several major variables in order to achieve constant adhesion levels.

1028 **Design and Application of Latex-Coated Cables for Missile Systems**—By W. K. Priestley, E. J. D'Aquanno and C. J. Tappero
The extreme demands made on reliability of missile system components have led to the development of special compounding and vulcanization procedures.

1033 **New Paths for Tire Cords Through Fugitive Lubricants**
Nylon cords are placed to best advantage for stress resistance in tires if stearic acid is applied to the tacky stock.

1034 **Materials Control for the Smaller Rubber Plant**
Specific measures to avoid bottlenecks in ordering, inspection, storage and consumption of materials are suggested in this Special Industry Report.

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* Appears every other month

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Indexed in Industrial Arts Index and Engineering Index

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Highlights Sidelights *of the News . . .*

March, 1960

ASTM Committee D-11 on Rubber and Rubberlike Materials held its Spring Meeting on February 3 to 5, 1960, in conjunction with Committee Week of the parent group . . . Almost all subcommittees met and worked on current problems . . . Heard was a report from the American Group of ISO/TC-45 (page 1037).

On March 6, the 1958 Food Additives Amendment to the Federal Food, and Cosmetics Act took effect . . . The Amendment has been interpreted in some quarters to include many rubber products as well as the compounding ingredients which have gone into their manufacture . . . General confusion as to the implications of the Act exists according to many rubber manufacturers who see themselves unable to comply with its terms at the deadline date (page 1048).

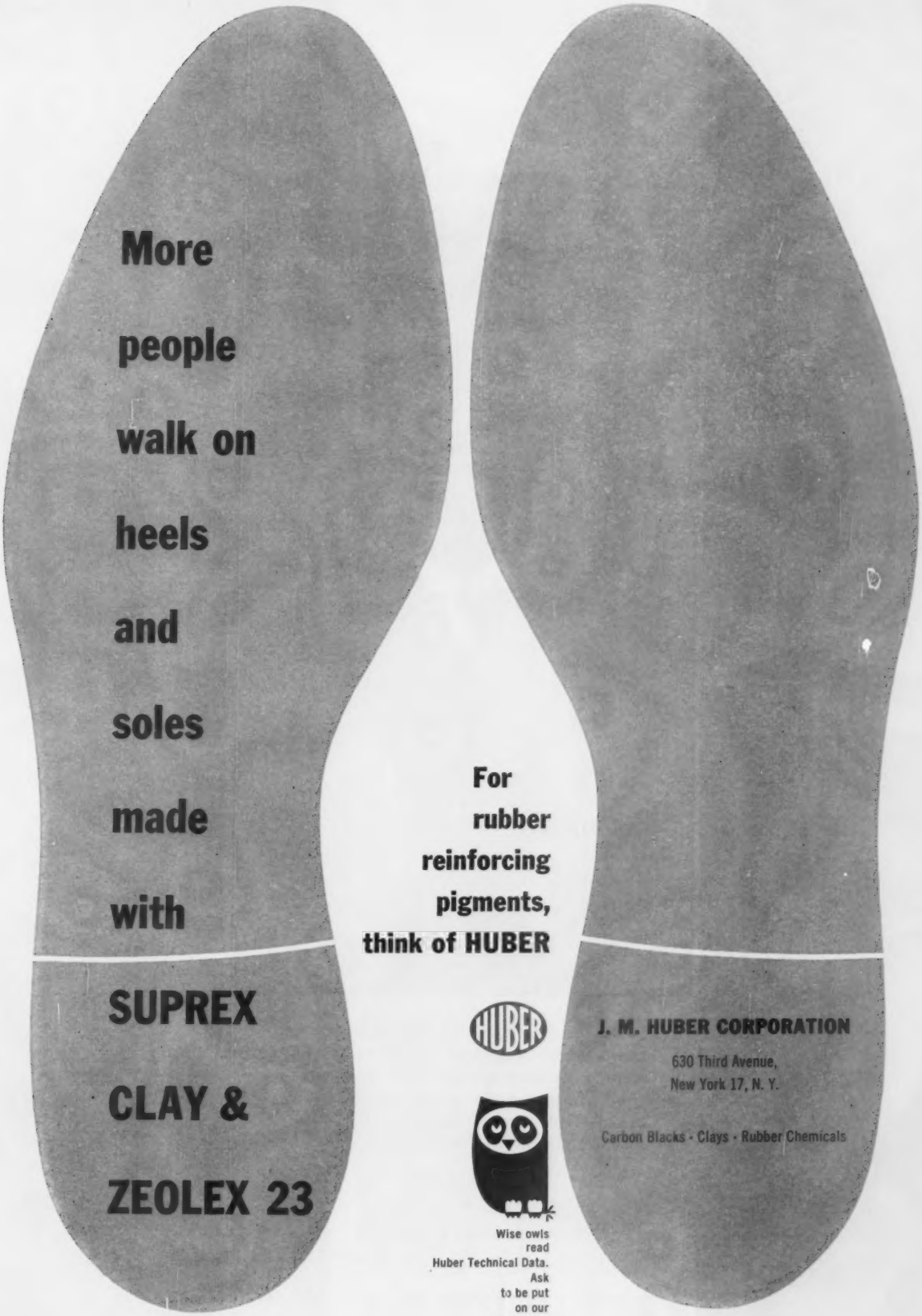
The February 19th meeting of the Connecticut Rubber Group was devoted to a symposium on "Polymers for the 60's" . . . Four panelists addressing themselves to the problems which lie ahead, predicted a decade of technical advance for the rubber industry (page 1050).

U.S. Rubber reports that its sales and income in 1959 set new records for the company . . . 1959 income increased 12 per cent to $35.5 million while net sales totaled $976.7 million . . . The new records were set in spite of a 22-day strike of employees in April of 1959 and the 116-day steel strike which severely curtailed automobile production (page 1056).

Goodrich Chemical has announced plans for the construction of a plant near Long Beach, Calif., for the production of vinyl resins and compounds . . . Completion is scheduled during the second quarter of 1960 (page 1062).

A California federal court, in a precedent setting move, has stopped a California tire retreading company from duplicating the tread design of the Dual 90 produced by General Tire . . . The court ruled that in producing and selling a tire with a tread design similar to the Dual 90, the retreading company had committed acts of unfair competition (page 1063).

Expenditures of $6.1 million are anticipated in the 1960 capital budget of the Polymer Corp., Ltd., Sarnia, Ont., Canada . . . The budget reflects a generally optimistic economic outlook, both in Canada and abroad, with continuing growth in rubber consumption (page 1064).



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rubber
reinforcing
pigments,
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HUBER

Wise owls
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Huber Technical Data.
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on our
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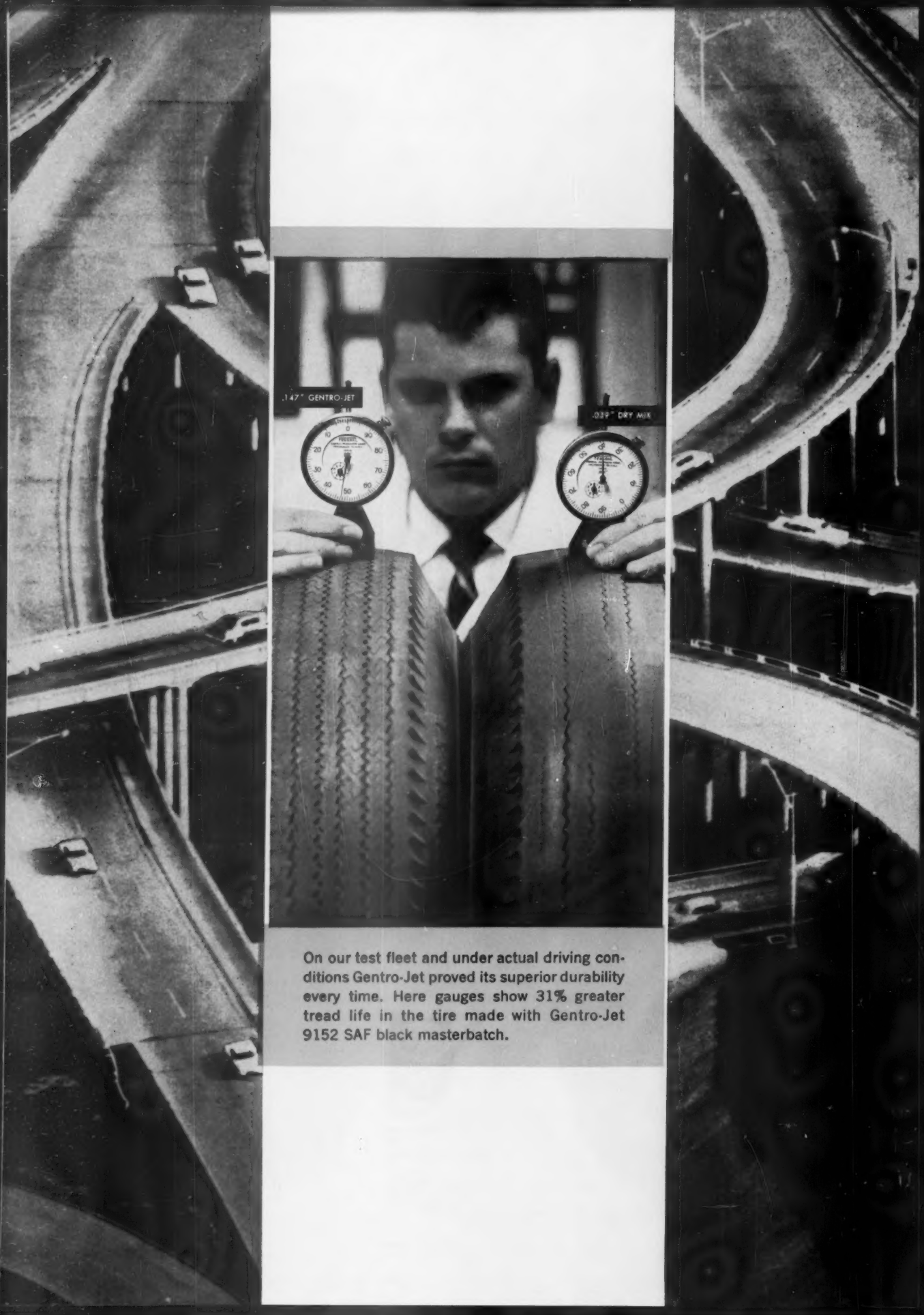
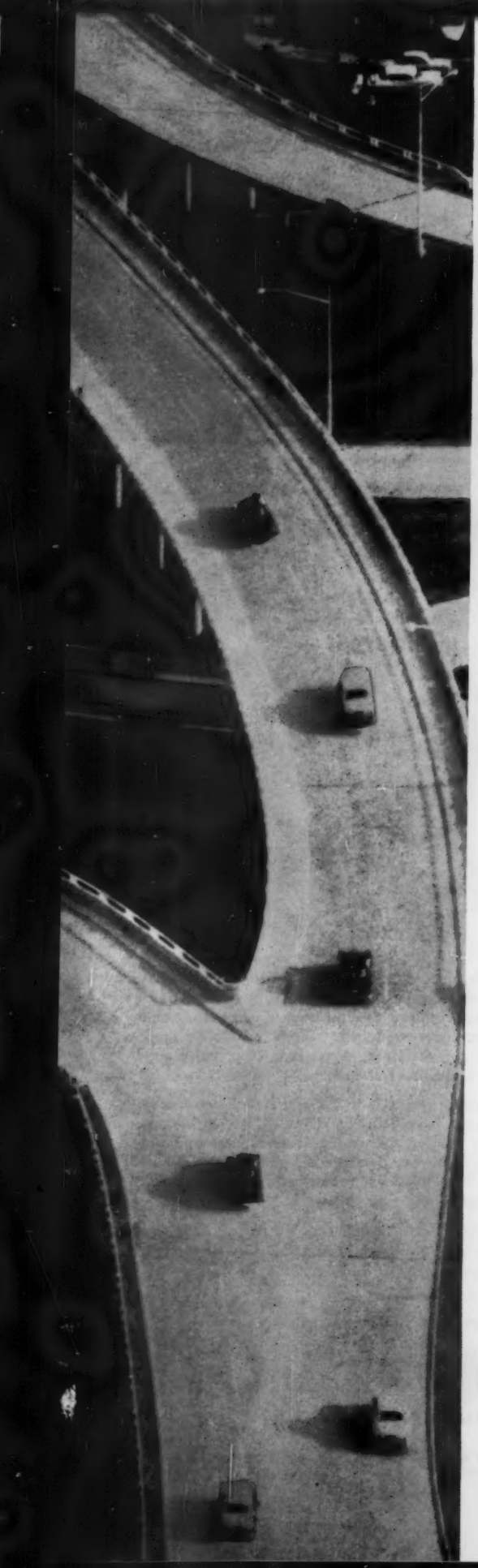


On our test fleet and under actual driving conditions Gentro-Jet proved its superior durability every time. Here gauges show 31% greater tread life in the tire made with Gentro-Jet 9152 SAF black masterbatch.



Gentro-Jet®

improves tread wear up to 30%!

Fleet road tests prove Gentro-Jet 9152 SAF black masterbatch offers better road wear in tires than any other commercially available rubber-black combination . . . more than 30% better wear than tires made with conventional dry mix. Use Gentro-Jet in your formulations for improved tread wear.

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Faster processing • Savings in shipping, storage and handling • Assures cleaner in-plant operation.

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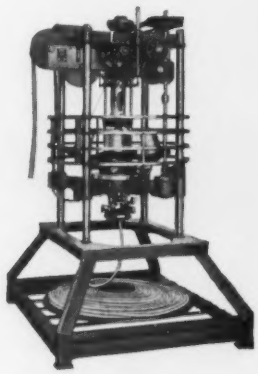
Chemicals for the rubber, paint, paper, textile, plastics and other industries: **GENTRO SBR** *rubber* **GENTRO-JET** *black masterbatch* • **GEN-FLO** *styrene-butadiene latices* • **GEN-TAC** *vinyl pyridine latex* • **GENTHANE** *polyurethane elastomer* • **ACRI-FLO** *styrene-acrylic latices* • **VYGEN PVC** *resins and compounds* • **KURE-BLEND** TMTD *masterbatch* • **KO-BLEND** *insoluble sulfur masterbatch*

New Lock Stitch* Reinforcement for Automotive and Industrial Hose at 1,000 FEET PER HOUR with the FIDELITY Vertical Knitter



Knit rayon, cotton, nylon — all natural or synthetic yarns on rubber hose extrusions in continuous lengths; at speeds up to 1,000 feet per hour. Fidelity's new *lock stitch* method of hose reinforcement assures the positive resistance to expansion under pressure, required for today's automobile radiator, windshield wiper, gasoline and heater hose, as well as other types of industrial rubber hose. Hose is strong *and* flexible, adhesion is better . . . diameters are uniform . . . expansion is restricted.

Electrically controlled Fidelity Hose Reinforcement Knitters are setting new standards for quality hose production *and* economy never before possible with conventional Braiding machines. The Fidelity method utilizing less floor space, completely eliminates costly rewinding, treating and drying operations . . . takes yarn direct from 10 pound cones—requires no special package.

Learn for yourself why Fidelity Hose Reinforcement Knitters have been the choice of the world's foremost Rubber and Plastic Hose Manufacturers for nearly 25 years. Write for Catalog HRA . . . or visit our Philadelphia showrooms and see a Fidelity in operation.

*Patented
U. S. Patent #2,788,804

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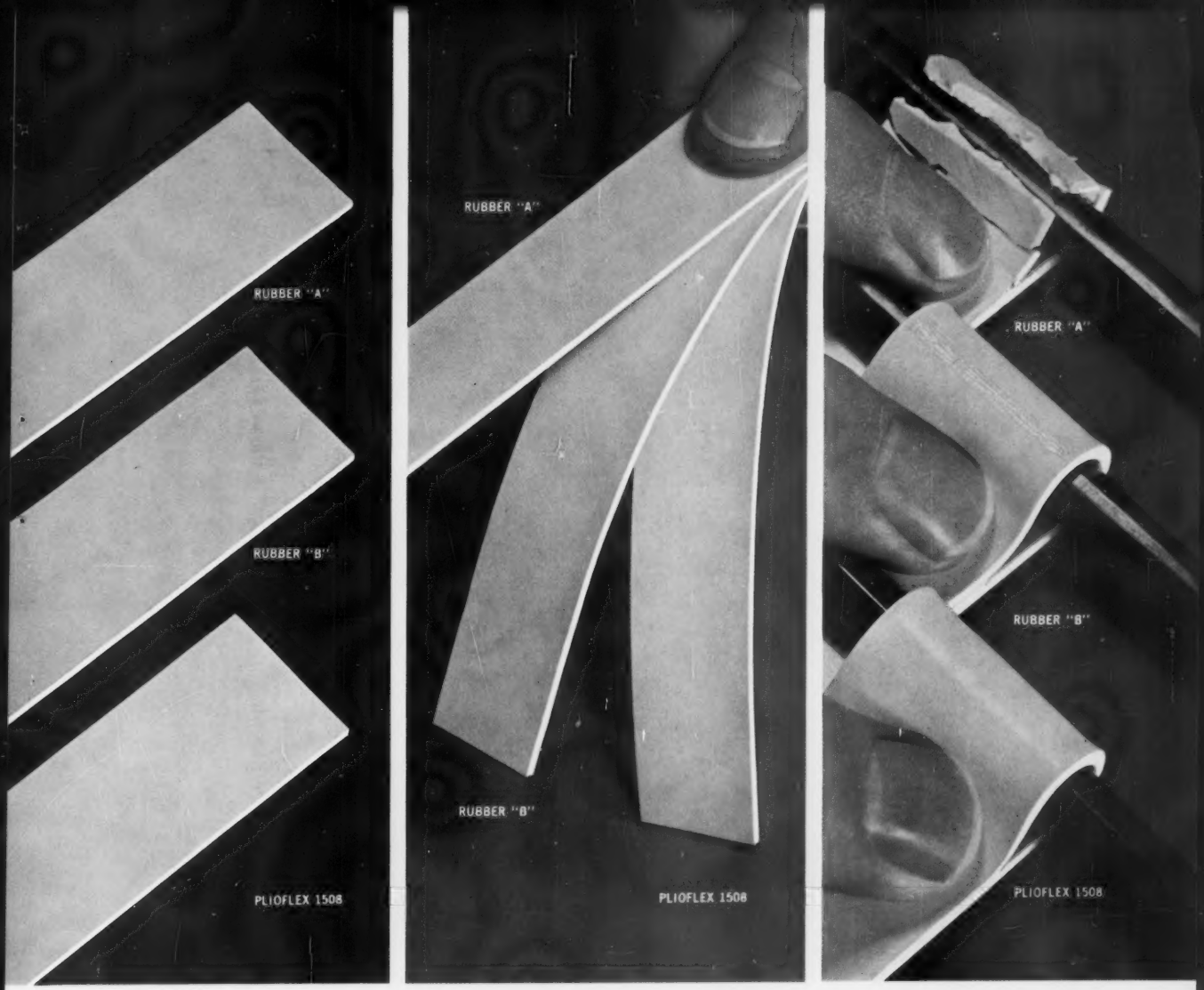


Now, age needn't come before beauty...thanks to PLIOFLEX 1508

Time was when "age before beauty" was the rule with rubber compounders. But that's all over, now, thanks to PLIOFLEX 1508.

A new "cold" rubber, PLIOFLEX 1508 is exceptionally light-colored and stays that way. Witness the tests above, wherein simple comparisons of color, stiffness and cracking are made between samples of PLIOFLEX 1508 and other light-colored rubbers, all roof-aged for three months.

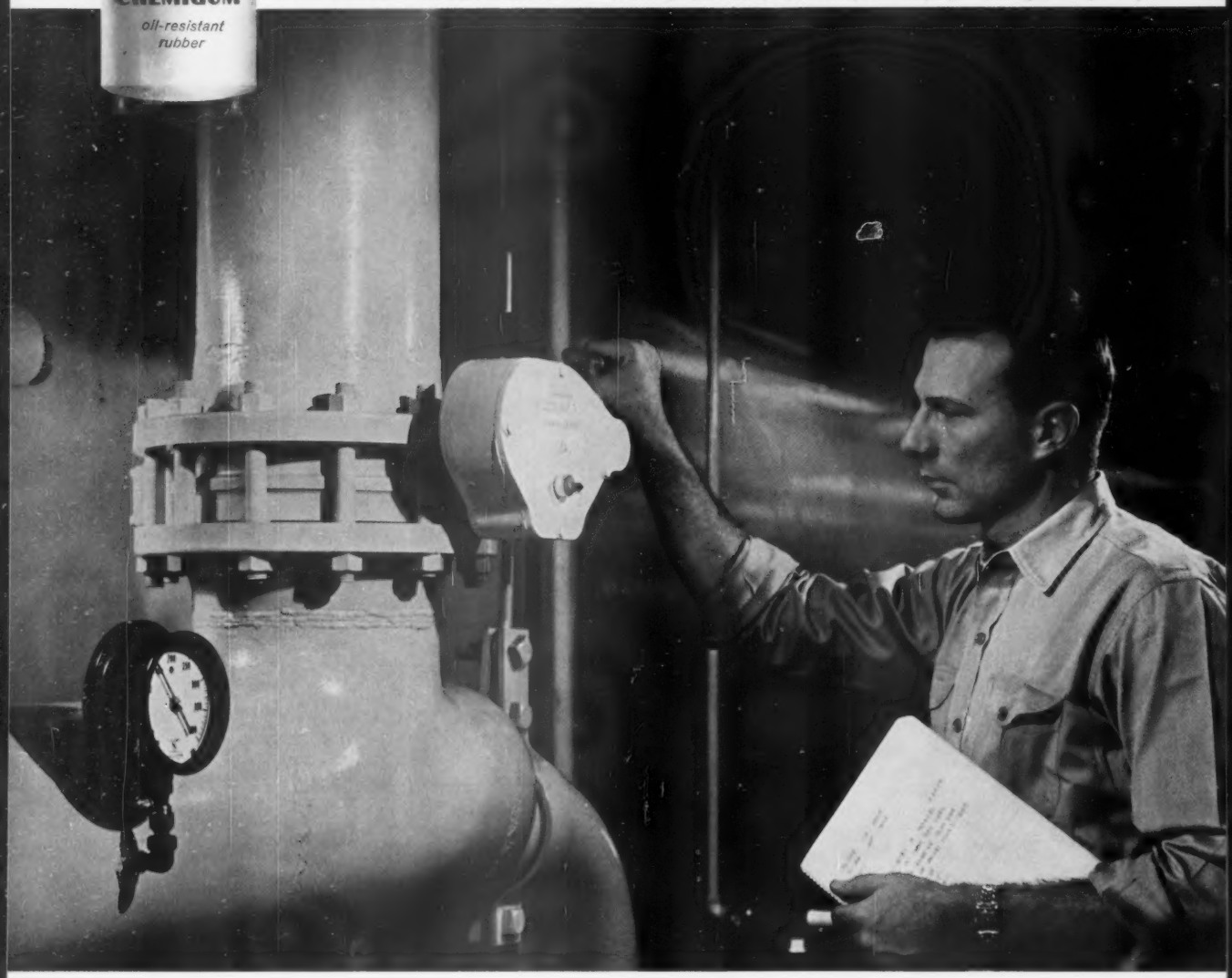
Over and above its excellent color-stability and age-resistance, PLIOFLEX 1508 exhibits outstanding physical properties and a very favorable APF (Assured Processability Factor). Where can you use all these features to advantage? For full details, including *Tech Book Bulletin #PF-28,* write Goodyear, Chemical Division, Dept. O-9419, Akron 16, Ohio.

GOODYEAR

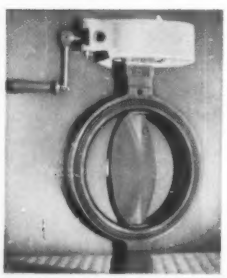
CHEMICAL DIVISION

Plioflex—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

—as used to make better seats and valves at Central Rubber Company, Belvidere, Ill., and Henry Pratt Company, Inc., Chicago, Ill., respectively



10,000 Good Turns – all easily done with CHEMIGUM!



Quite new in concept is the "butterfly" valve pictured here. It quickly and surely controls the flow of highly corrosive liquids at pressures up to 150 pounds and, in tests, easily survives 10,000 cycles — the equivalent of 20 years' service.

Much of the valve's success stems from the use of CHEMIGUM in its integrally molded seat. CHEMIGUM was chosen because of its easier processing, better bonding and excellent resistance to petroleum products, chemicals, water and wear.

How can CHEMIGUM help your product take a turn for the better? Full details are yours by writing Goodyear, Chemical Division, Dept. O-9419, Akron 16, Ohio.

Chemigum—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

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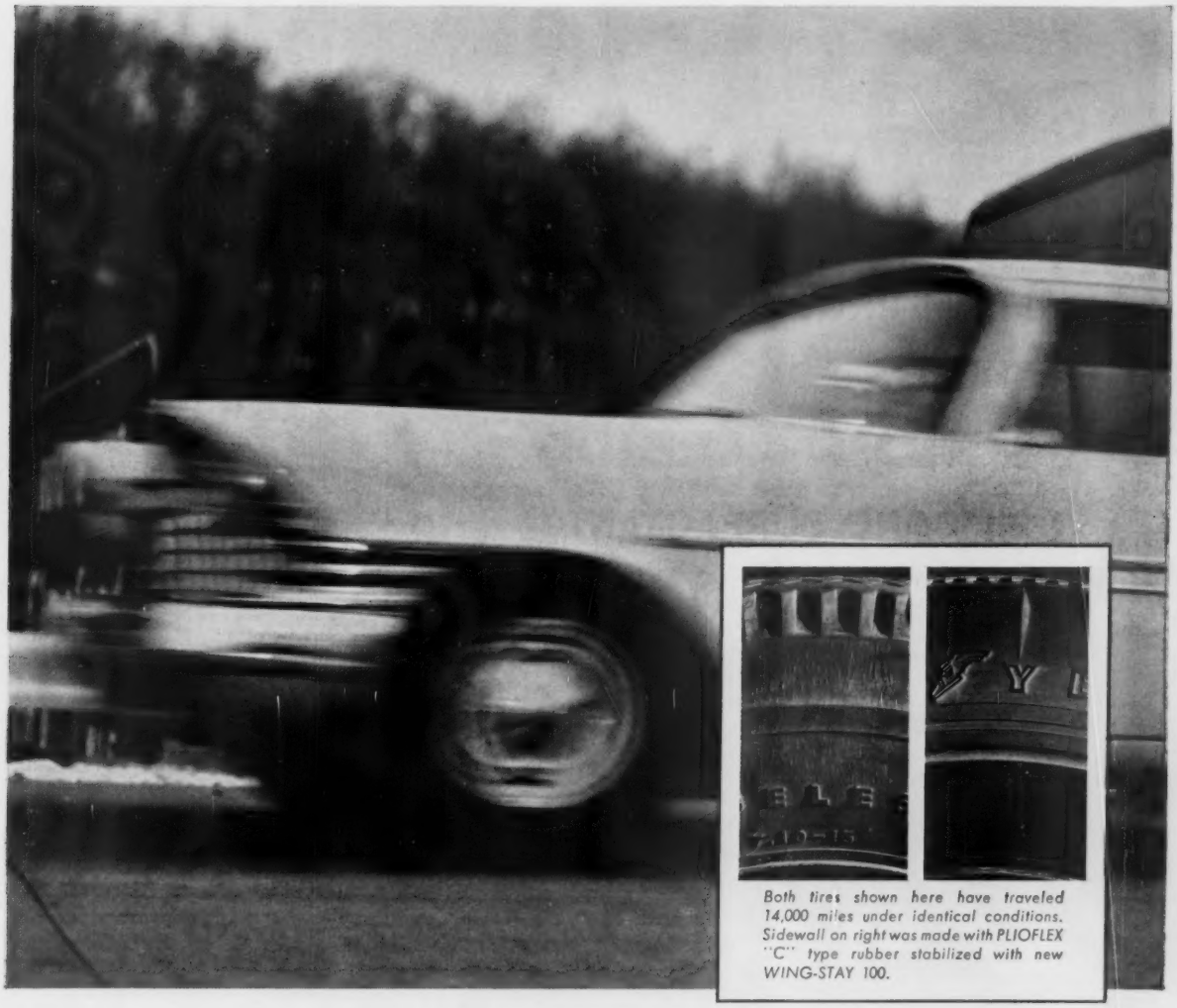

Both tires shown here have traveled 14,000 miles under identical conditions. Sidewall on right was made with PLIOFLEX "C" type rubber stabilized with new WING-STAY 100.

Now—rubber that keeps its age a secret

Whirling around a test track—or spinning through traffic—tires *age* with wear. The effects of this aging process show up most often in the sidewalls, where small cracks appear. Not only do they mar the looks of the tire, they rob it of strength and cut into its service life.

What causes cracking? Two things, mainly—atmospheric oxygen and ozone. To combat them, antioxidants have been developed. So have antiozonants. *But not until now* has a truly effective *combination* of antioxidant and antiozonant been perfected. And that's WING-STAY 100 by Goodyear.

The superior protection of Wing-Stay 100 can be yours in four new PLIOFLEX rubbers. Dynamic aging resistance thus becomes another key advantage of PLIOFLEX 1500C, 1710C, 1712C, and 1714C – along with assured processability, high uniformity and excellent physical characteristics.

For more information and complete technical service on PLIOFLEX "C" type rubbers—plus other rubber chemicals and a full line of synthetic rubbers—write:

Goodyear, Chemical Division, Dept. O-9419
Akron 16, Ohio

GOODYEAR

CHEMICAL DIVISION

Wing-Stay, Plioflex—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

One shot, water blown flexible polyether foam requires 0.3 to 0.8% of UNION CARBIDE Surfactant L-520. No other surfactant gives the good stable rise, open cells and fine pores so necessary for high quality use such as cushioning.

One shot, fluorocarbon blown flexible polyether foam for extra soft pillows is almost impossible without UNION CARBIDE Surfactant L-520. Gives a good stable rise, too. Concentrations up to 1.5%.

One shot, rigid polyester foam, such as used for structural purposes, has virtually 100% closed cells with only 0.1 to 0.5% of XL-521.

Prepolymer, flexible polyether foam has 85% open cells, uniform structure when 10 or 50 cstk. UNION CARBIDE L-45 is used.

Prepolymer, semi-rigid polyether foam, such as required in crash-pad applications, is best made with about 1 to 2% of UNION CARBIDE LE-452 metered in at the foam machine.

Prepolymer, fluorocarbon blown rigid polyester foam, of the type used in refrigerator insulation, is 90% closed cells, has good rise and fine pores if made using between 0.1 and 0.5% of UNION CARBIDE XL-521 added to the prepolymer side. Closed cells hold fluorocarbon gas for low thermal conductivity.

LIKE TO KNOW MORE? Samples of these special silicone surfactants and Silicones Man technical aid from Dept. CR-4902 Silicones Division, Union Carbide Corporation, 30 East 42nd St., New York 17, N.Y. *(In Canada:* Union Carbide Canada Limited, Toronto 7.)

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News in Brief

► A technical article containing a series of case studies which show why the scaling-up of solids processing equipment is different and difficult, has been published by Sprout, Waldron & Co., Muncy, Penna. The article covers the scale-up of knife cutters, attrition mills, roller mills, mixers, pellet mills and sifters. Also covered are methods for arriving at the key factor, the difficulties in projecting laboratory data and the value of experience. Ask for Bulletin 1-64.

► A plastics safety handbook has been produced by the Society of the Plastics Industry in cooperation with the National Safety Council. Many processes in the plastics industry are specifically treated with the latest safety methods and practices explained in detail. Copies of the handbook can be obtained from the Society of the Plastics Industry, Inc., New York, N. Y. Single copies cost $5.00.

► Brill Equipment Co., has moved to a new location at 35 Jabez Street, Newark 5, N. J. The company previously was located at 2401 Third Avenue, New York, N. Y.

► Cellular Plastics Division of The Society of the Plastics Industry has formed a Public Relations Committee to promote greater public acceptance and understanding of cellular or foamed plastics. James P. Foley (Allied Chemical) has been named chairman of the new committee, and Joseph V. Keneally (Union Carbide Chemicals) is vice-chairman.

► American Synthetic Rubber Corp., New York, N. Y., has issued fact sheets on three synthetic rubbers; ASRC-3106, a copolymer of butadiene and styrene; ASRC-1712 and ASRC-1713, both oil-extended rubbers.

► A new booklet entitled "Chemical Loaded Molecular Sieves" has been issued by the Linde Co., Division of Union Carbide Corp., 30 E. 42 St., New York, N. Y. The booklet explains how chemicals are stored in Linde Molecular Sieves, indicates various established uses and chemicals that can be loaded, and gives other pertinent data.

► Recent issues of *Tech Book Facts,* released by the Chemical Division of the Goodyear Tire and Rubber Co., deal with "Plioflex 1507 Pigmentation Study" (Compounding PF-23); "Plioflex 1714C "Pigmentation Study" (Compounding PF-24); and "Plioflex 1508X" (Types and Properties PF-28).

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In frigid northern climate or in the humid tropics . . . for use with hot industrial machinery or with telephone wires . . . electrical insulation compounds, modified with Marbon 8000 AE resin give superior performance.

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For your next SBR wire insulation compound that must really take it, specify Marbon 8000 AE resin.

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MARBON CHEMICAL B-W BORG-WARNER

DIVISION **BORG-WARNER** WEST VIRGINIA

AUTOMATION IN ACTION—Mammoth production requirements are met by this giant automated press which was developed by the Erie Foundry Company of Erie, Pennsylvania. It is equipped to turn out 1200 forgings an hour, requires only a single operator, and can outproduce a crew operating a hand-fed unit two or three times. Designed for the high volume forging of such parts as connecting rods, gear blanks, auto and tractor valves, stem pinions, ring gears, track links and wheel hubs, this masterpiece of engineering has a capacity of 2500 tons and weighs about 320,000 pounds. It swings into action when driven by this efficient Poly-V®M Section belt powered by a 250 H.P. motor. The belt, 18" wide (48 ribs), 301" long, was made by Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, New Jersey, employing Mount Vernon fabrics.

This is another example of how fabrics made by Mount Vernon Mills, Inc., and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

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how to vastly increase the useful life of rubber...

Consider the effect of your curing system on the effectiveness of a chemical antiozonant

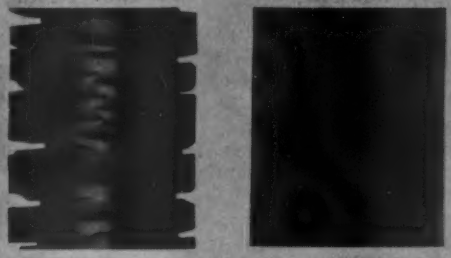
In compounding rubber, use of a potent antiozonant like UOP 88 or 288 is essential in assuring maximum crack-free life. But do you realize what a vast difference may be made by your *curing system?*

Look at the two rubber test strips illustrated. Both were formulated with UOP 88 . . . but note how much more effectively the antiozonant worked when accompanied by this change in curing systems —a vast increase in resistance to cracking!

Help in achieving maximum effectiveness from UOP 88 or 288 antiozonants is available through UOP facilities and technical personnel. Just write or telephone our Products Department.

UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

The SBR specimens below were exposed to ozone at 100°F with 20 percent elongation for 52 hr. at 33 pphm ozone, then 167 hr. at 63 pphm ozone.



Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethylthiuram disulfide; Hours to first crack—7 to 23.

Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 239 hr.

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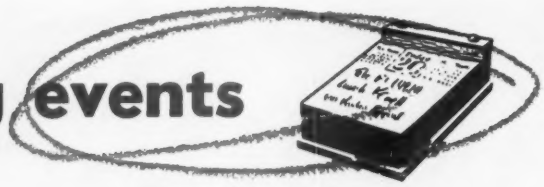
WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW

coming events



March 18. Boston Rubber Group, Technical Meeting, Somerset Hotel, Boston, Mass.

March 23-24. Commercial Chemical Development Association, Annual Meeting, Plaza Hotel, New York, N. Y.

March 24. Southern Ohio Rubber Group, Spring Meeting, Gibbons Hotel, Dayton, Ohio.

March 24-25. Textile Research Institute, Annual Meeting, Hotel Commodore, New York, N. Y.

March 25. New York Rubber Group, Spring Meeting, Henry Hudson Hotel, New York, N. Y.

March 26. Fourth Annual Symposium on Recent Advances in Programming Methods, Ohio State University, Columbus, Ohio.

March 28-April 1. Greater New York Safety Council, 30th Annual Safety Convention and Exposition, Statler Hilton Hotel, New York, N. Y.

March 29-31. American Society of Mechanical Engineers, American Power Conference, Sherman Hotel, Chicago, Ill.

March 30-31. Plastics Institute Conference on Polymeric Progress, William Beveridge Hall, London University, London, England.

March 30-April 1. Canadian Tire Dealers Association, Annual Meeting, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

March 31-April 1. American Society of Mechanical Engineers, Textile Engineering Conference, North Carolina State College, Raleigh, N. C.

April 1. Akron Polymer Lecture Group, University of Akron, Akron, Ohio.

April 1. International Natural Rubber Symposium, Frankfurt, West Germany.

April 3-6. National Toy Show, Morrison Hotel, Chicago, Ill.

April 3-8. Sixth Nuclear Congress & Exhibit, New York Coliseum, New York, N. Y.

April 4-5. Industrial Accident Prevention Association, Annual Conference, Royal York Hotel, Toronto, Ontario, Canada.

April 5. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

April 5-14. American Chemical Society, 137th National Meeting, Cleveland, Ohio.

April 7. Rhode Island Rubber Club, Spring Meeting, Pawtucket Country Club, Pawtucket, R. I.

April 8. Akron Rubber Group, Technical Symposium, Sheraton Hotel, Akron, Ohio.

April 8. Chemical Institute of Canada, Rubber Division Annual Conference, Walper Hotel, Kitchener, Ontario, Canada.

April 8-9. Society of the Plastics Industry, 17th Western Section Conference, New Riviera Hotel, Palm Springs, Calif.

April 9-26. Fourth Osaka International Trade Fair, Osaka, Japan.

April 12-27. Milan Trade Fair, Milan, Italy.

April 14. Fort Wayne Rubber & Plastics Group, Technical Meeting, Van Orman Hotel, Fort Wayne, Ind.

April 14. Northern California Rubber Group, Elks Club, Berkeley, Calif.

April 18-19. Conference on Automatic Techniques, Sheraton Cleveland Hotel, Cleveland, Ohio.

April 19. Association of Consulting Chemists & Chemical Engineers, Forum Meeting, Hotel Shelburne, New York, N. Y.

April 20. Quebec Rubber & Plastics Group, Technical Meeting, Queen's Hotel, Montreal, Quebec, Canada.

April 20. Washington Rubber Group, Field Trip to Kelly-Springfield Plant, Cumberland, Md.

April 22. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

April 22. Detroit Rubber & Plastics Group, Spring Meeting, Detroit Leland Hotel, Detroit, Mich.

April 24-May 3. German Industries Fair, Hanover, West Germany.

April 25-26. American Society of Mechanical Engineers, Maintenance and Plant Engineering Conference, Chase and Park Plaza Hotels, St. Louis, Mo.

April 25-26. Society of the Plastics Industry (Canada), 18th Annual Canadian Section Conference, London Hotel, London, Ontario, Canada.

April 27-29. Second European Symposium on Chemical Reaction Engineering, Amsterdam, The Netherlands.

April 29. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

May 3. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

May 3-6. Division of Rubber Chemistry, American Chemical Society, Spring Meeting, Statler Hotel, Buffalo, N. Y.

May 3-13. International Mechanical Handling Exhibition and Materials Handling Convention, London, England.

May 4-5. Wire Association, Electric Wire & Cable Section, Regional Meeting, Sheraton Hotel, Pittsburgh, Penna.

May 4-14. Fourth Annual United States World Trade Fair, New York Coliseum, New York, N. Y.

May 5. National Bureau of Standards, Division of Organic and Fibrous Materials, Lecture Series on Chemistry and Physics of High Polymers, Materials Testing Laboratory, Washington, D. C.

May 11-13. Society of the Plastics Industry, National Conference, Americana Hotel, Bal Harbor, Fla.

May 12. Northern California Rubber Group, Elks Club, Berkeley, Calif.

May 14-29. Foire de Paris, Sixth Exposition of Plastics Materials and Rubber, Parc des Expositions, Paris, France.

May 15-18. Twenty-Fifth Annual International Distribution Congress and Business Aids Show, Statler Hilton Hotel, Buffalo, N. Y.

May 16-17. Chemical Specialties Manufacturers Association, 46th Midyear Meeting, Drake Hotel, Chicago, Ill.

May 16-17. Chemical Market Research Association, Annual Meeting, Hotel Biltmore, New York, N. Y.

May 17-19. American Society of Mechanical Engineers, Production Engineering Conference, Hotel Schroeder, Milwaukee, Wisc.

May 18-20. Society for Experimental Stress Analysis, Spring Meeting, Hotel Severin, Indianapolis, Ind.

May 20. Connecticut Rubber Group, Technical Meeting.

May 23-26. American Society of Mechanical Engineers, Design Engineering Conference and Show, Statler Hilton Hotel, New York, N. Y.

Sept. 13-16. Division of Rubber Chemistry, American Chemical Society, Fall Meeting, Hotel Commodore, New York, N. Y.

October 4-7. International Rubber Conference, West Berlin, Germany.

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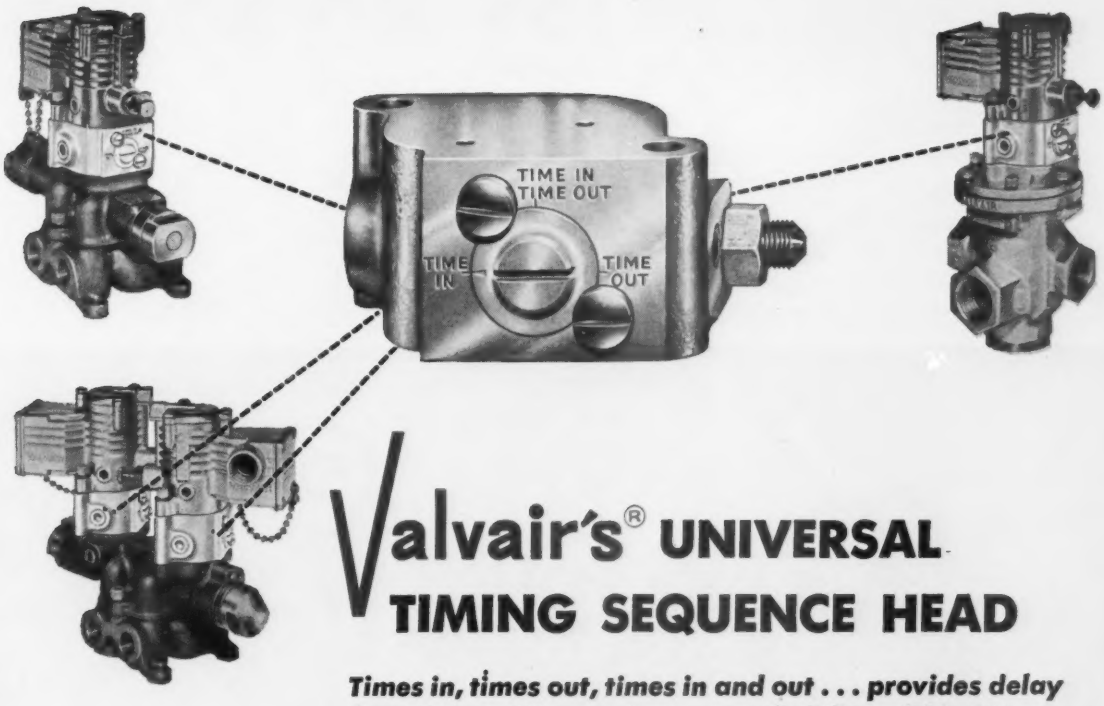
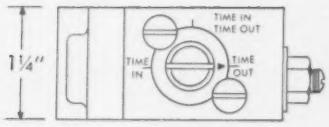


Valvair's® UNIVERSAL TIMING SEQUENCE HEAD

Times in, times out, times in and out . . . provides delay from 0 up to 30 seconds . . . repeatability within 2% . . . changes function without disassembly . . . for use with any Valvair Speed King or Inline Valve



For accurate control, to simplify circuits, to eliminate timers and relays, to lower control component installation and maintenance costs, use Valvair's universal timing sequence head. This unit is supplied in two types; one for direct mounting between the pilot and valve body; one for direct mounting on the valve body, with remote pilot control.

Function can be changed in seconds, *without disassembly* and with line pressure on the valve. Just loosen the lock screws slightly, turn the indicating barrel to the desired function mark, then tighten the lock screws.

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Find out how Valvair's sequence head can provide the results you want, at a cost saving you'll like, on the new equipment you're designing or on existing machines you're up-grading. Yes, this sequence head can be used on your present SPEED KING and INLINE valves, too. Ask your Valvair or Bellows Field Engineer for recommendations . . . they're located in over 125 major industrial cities.

For more information, write for Bulletin E-1 A. Address Dept. RA-360 Valvair Corporation, 454 Morgan Ave., Akron 11, Ohio.

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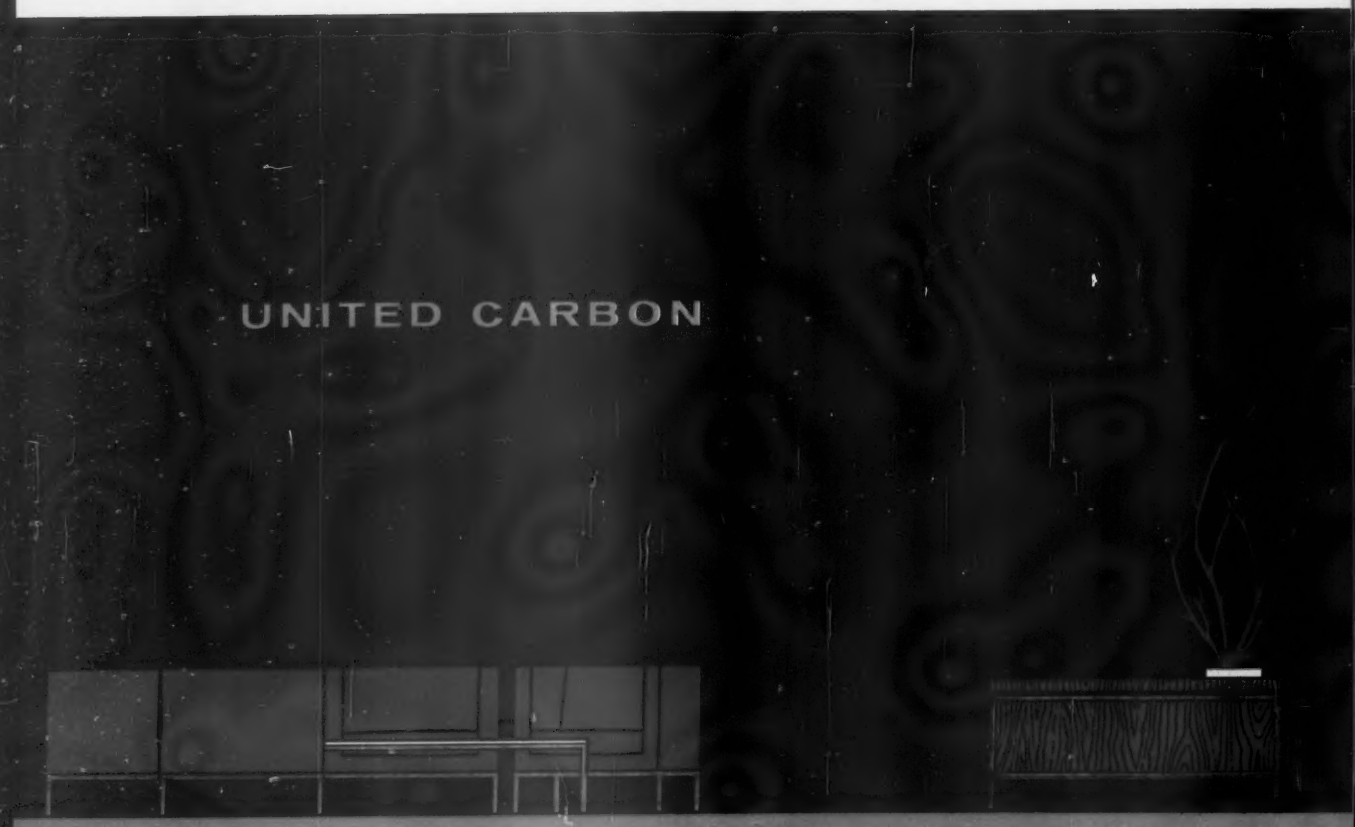

In the past nine months there have been major personnel re-alignments and several technical facility and office relocations—all directed toward broadening United's services to its customers. Recently we had the pleasure of announcing the locations of our new home offices and our marketing headquarters. It is my privilege now to introduce our new Marketing Group and our district sales managers. We look forward to serving you with faster deliveries, finer technical service and ever improving products.

MORRISON M. BUMP
Director of Marketing

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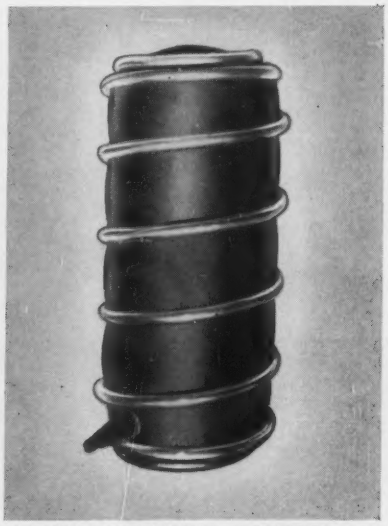
WHAT'S NEWS IN RUBBER

RADIATOR HOSE of Enjay Butyl holds off deterioration from heat, rust inhibitors, anti-freeze and other chemicals. Keeps its shape and resiliency for years.

WINDSHIELD STRIPPING of Enjay Butyl resists ozone, weathering, sunlight, and retains elasticity, color, smoothness far longer than SBR or natural rubber.



PNEUMATIC SPRING CONTROL of Enjay Butyl provides outstanding air retention and aging resistance. Tough and weatherproof, too.

TIRES of "No-Screech" Enjay Butyl deliver super traction for fastest, safest stops! Resist off-road abrasion, chipping. Side walls don't crack or "powder off."

BODY BUMPERS of Enjay Butyl absorb impact instead of transmitting shock. Butyl "load cushions" for trucks damp out vibration, replace springs.

DRIVESHAFT HANGER of Enjay Butyl damps out driveshaft vibration, thus effectively limiting the rotating shaft's resonant response.

ENJAY BUTYL...PREFERRED RUBBER

Engineers who pick and choose automotive materials prefer Enjay Butyl over natural and other types of rubber for many important applications... and the list is growing. A few examples are shown above.

The all-around resistance of Enjay Butyl to destructive conditions is well proven...it stands up to weathering, sunlight, heat, cold, electric arcing,

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flexing, tearing, abrasion, chemicals. And . . . Butyl is outstanding for its air-holding in such pneumatic applications as inner tubes, hose, and pneumatic spring controls.

Why not check into the advantages that versatile Enjay Butyl can give your product? Call or write us today.

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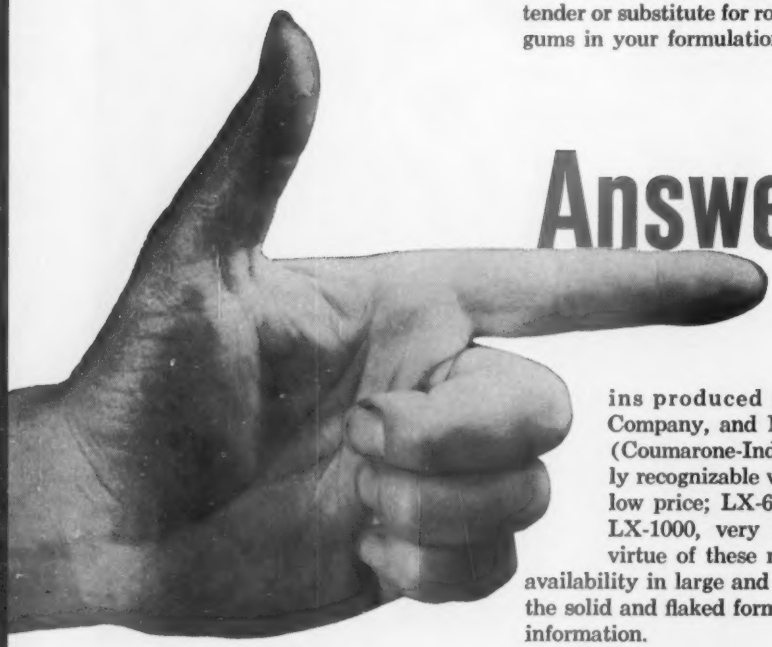
ENJAY BUTYL

Question:

Has scarce supply caused you to look for an extender or substitute for rosins, wood rosins or ester gums in your formulations?



Answer:

If so, we suggest you experiment with the LX series of hydrocarbon resins produced by Neville Chemical Company, and Neville's full line of C-I (Coumarone-Indene) resins. Immediately recognizable virtues are: LX-782, very low price; LX-685, high versatility; and LX-1000, very light color. A common virtue of these resins is their immediate availability in large and small quantities, both in the solid and flaked form. Write to us for further information.

Neville Chemical Company · Pittsburgh 25, Pa.

NEVILLE®

capitol cues

MONEY WON'T GET ANY TIGHTER THIS YEAR—that is what many government officials and leading bankers are now predicting. They find the recent dip in the interest rates the Treasury must pay on its obligations significant. It reflects a substantial slowing down in the pace of business borrowing.

Added to the doubts created by the easing of money has been the start-of-the-year weakness in the stock market. In turn, this weakness is related to business events. Volume of auto sales has not been as great as expected and the build-up in steel inventories has moved at a faster-than-expected pace.

There's always the possibility that this softening is only temporary. Despite those signs, the experts could be wrong. There could be some tightening late in the Spring. The tax liability of corporations will be huge; so they will have to borrow. Many different lines will still be adding to their inventories—and this will require some new bank loans.

PRESSURE OF INFLATION WILL SOON BE NOTICEABLY EASIER, say government economists—even if another period to tight money should develop late this Spring. They don't claim that the wage-price spiral has ended. But there will be fewer...and smaller...price hikes this year. (The Consumer Price Index will still go up, but largely because farm prices will be firming.) The country is now settling down to an era of slower erosion of the dollar.

Here's what's behind this optimism about easing inflation:

- The steel settlement was not as large as in recent years, despite the headlines. It will lift wages 3% to 3½% yearly; the other unions are not likely to win much more than this.
- Productivity gains will offset much of the higher costs of wages in 1960. In the past, they have run about 3% a year.
- Budget surpluses are now here. This fiscal year's will be small, but 1961's will be greater, regardless of what the Congress does. Federal deficits are a key inflation cause.

IS THE STOCK MARKET SIGNALLING BUSINESS SOFTNESS later on this year? Some analysts in government and in business think that it is. They see the near-term outlook for business as bright but point out that the prospects for later in the year are something else again. Steel inventories will have been built up again. Auto sales may be past peak. House-building will be down. The stock market is by no means infallible. But it very often does turn down three months or more in advance of general business activity.

A CUT-BACK IN AUTO ASSEMBLY FROM PLANNED SCHEDULES seems increasingly necessary at this time. Production was planned at 2,278,500 units for this three months, up 42% from last year. But sales did not pick up as fast as had been hoped for. And dealer inventories are now ample. Such cut-backs aren't catastrophic. But they may be a sign that business is slowing down.

capitol cues (cont'd)

A STRONG DRIVE TO BLOCK FURTHER TARIFF CUTS will be launched in Congress this year. Legislators with constituents hurt by imports will push for adoption of a resolution calling on the President not to grant new bargaining concessions to other nations at conferences already planned for next year. Adoption of this proposal would make it difficult—politically, if not legally—for Ike to act. He still backs free trade and his influence will be thrown against the proposal. Its defeat would put a damper on protectionist hopes for several years to come.

POLITICAL FEVER KEEPS RISING IN WASHINGTON, though the conventions are still months away. But, already, Congressmen seem to prefer talking politics to passing laws. They will still enact legislation to keep the U.S. running, and they will try to pass some to beef up party records. But most of the time will be spent—by the Democrats, anyway—on developing issues and picking the candidate they will support for the nomination—back home and at Los Angeles.

SENATOR LYNDON JOHNSON MAY BE KEY MAN at the Democratic convention. This is not to say that Johnson will end up winning the party's nomination. The most he seems likely to get is 300-plus votes, largely from the South. That's a long, long way from the 761 votes that are necessary for victory. Johnson, though, will have much to say in deciding who will be the nominee.

> He will have much of his Southern support to trade to some other hopeful. Which one is it likely to be? Maybe Senator Symington...maybe Adlai Stevenson...maybe Senator Kennedy.

NIXON HAS ALREADY SET THE TONE OF THE CAMPAIGN he'll wage this Fall. This is now clear from talks he has made to associates and political groups. As of now, he plans to follow two basic lines. He'll build on Eisenhower's present policies, promising to continue and to extend them if he is elected. He'll also wage a clean campaign, so as not to repel the Democrats he needs.

THERE IS STILL HOPE THAT ROCKEFELLER WILL YIELD and run with Nixon. GOP leaders feel that a Nixon-Rockefeller slate would be a "dream ticket." So they are refusing to accept as final his statements ruling himself out. They're hoping that party need and party pressure will change Rocky's mind. If he persists in declining, Nixon may turn to Mitchell, Halleck or Seaton.

THE OUTLOOK FOR MACHINE TOOLS for 1960 is bright. New orders will rise and sales will go up 25-30%. Prices, too, will rise—about 5%, with labor and materials costs. Tool-builders will still be plagued, however, by falling exports, rising imports, and sales of surplus government tools.

THE SENATE DRUG HEARINGS WON'T BRING NEW LEGISLATION, despite the big headlines won. Purpose of the probe was partly political, to make hay with consumers by denouncing high prices. Main result: Poor publicity for makers.

A NEW LIMIT ON MOISTURE CONTENT OF LUMBER purchased by the government may be imposed late this Spring. The U.S. is now considering a standard that would limit moisture content of wood purchased to 19%. The moisture content issue has split the industry. Western producers want the minimum higher.

THE FIELDS OF GREATEST JOB OPPORTUNITIES IN THE SIXTIES are shown in a new Labor Department Handbook. The best openings are expected in chemical and electrical engineering, physics, mathematics, medicine, and dentistry.

Ameripol Rubber puts luxury look in practical product

Rubber floor tile is the "practical" flooring.
It's well known for durability, ease of maintenance and modest cost
For these qualities almost any good synthetic rubber will do.

But Ameripol polymer 1502 enables the Armstrong Cork Company to produce rubber tile in striking beauty and color—color that won't stain, or fade in the sunlight. Because Ameripol 1502 is so consistently light and uniform, Armstrong can easily duplicate colors from production run to production run.

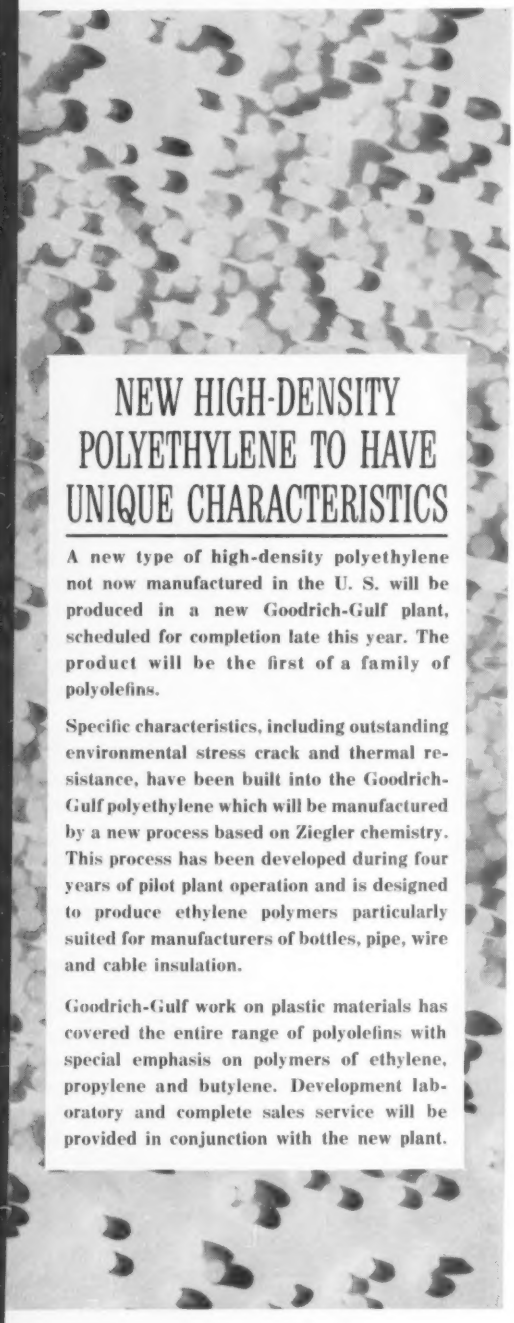
When you want to make a good rubber product *better*, there's particular reason for calling in Goodrich-Gulf. From production research and quality control, to technical service and warehousing, we're organized to meet your specific requirements.

For more information contact Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland 14, Ohio.

Ameripol
THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.

NEWS FROM GOODRICH-GULF



NEW HIGH-DENSITY POLYETHYLENE TO HAVE UNIQUE CHARACTERISTICS

A new type of high-density polyethylene not now manufactured in the U. S. will be produced in a new Goodrich-Gulf plant, scheduled for completion late this year. The product will be the first of a family of polyolefins.

Specific characteristics, including outstanding environmental stress crack and thermal resistance, have been built into the Goodrich-Gulf polyethylene which will be manufactured by a new process based on Ziegler chemistry. This process has been developed during four years of pilot plant operation and is designed to produce ethylene polymers particularly suited for manufacturers of bottles, pipe, wire and cable insulation.

Goodrich-Gulf work on plastic materials has covered the entire range of polyolefins with special emphasis on polymers of ethylene, propylene and butylene. Development laboratory and complete sales service will be provided in conjunction with the new plant.

NEW AMERIPOL 4600 IS EASIER PROCESSING RUBBER

A new, fatty acid emulsified, cold type styrene-butadiene copolymer is now available from Goodrich-Gulf. Called Ameripol 4600, the announcement of its development is being made after a year of extensive field testing, which indicates that it will be ideal for use in shoe soles, floor tile, sponge, white sidewalls, sport shoes and household goods.

Ameripol 4600 is similar to 1502 type polymer except a fatty acid emulsifier is used instead of mixed fatty acid rosin soaps. However, 4600 has some distinct advantages: its Mooney is in the 36-48 range rather than 46-58 and it is lighter in color.

The new polymer was produced primarily to provide rubber processors with an easier processing rubber exhibiting a faster cure rate, higher modulus, and less tack than 1502. With lower viscosity, the polymer can be broken down in drastically less time than usual. The reduced Mooney range also provides less power consumption at the processor's plant. The hardness of 4600 is slightly higher than 1502 for a given cure time.

LOOK AHEAD-NEW SYNTHETIC RUBBERS FOR TRUCK, AIRCRAFT, HEAVY VEHICLE TIRES

Advanced engineering work is underway at Goodrich-Gulf leading toward commercial production of two new synthetic rubbers, Ameripol SN rubber (polyisoprene) discovered by the company in 1954, and Ameripol CB (cis-polybutadiene) rubber, an equally important development.

Ameripol SN, the first man-made rubber having the same molecular structure as natural tree rubber, was first announced by Goodrich-Gulf in 1954. It possesses the physical properties of tree rubber even to tack and stickiness. Pilot plant operation has produced five distinct types in tonnage quantities for large scale testing. This program has demonstrated that Ameripol SN can be substituted pound for pound for natural rubber in the manufacture of truck, bus, aircraft, military, and off-the-road tires.

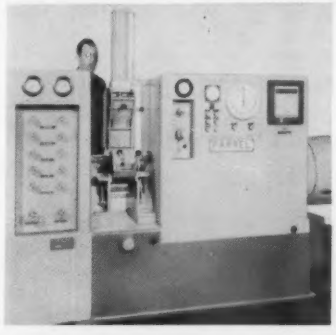
Ameripol CB rubber has excellent characteristics for minimizing heat build-up, which is a prime cause of the destruction of truck tires and other products. It is a stronger, tougher rubber at high temperatures than any other general purpose synthetic rubber now available.

When these new rubbers are available, it is anticipated that manufacturers of heavy-duty tires can reduce their dependence on tree rubber by 50 to 100 per cent. In addition to attractive physical properties, these new man-made rubbers will offer the major advantages of price stability and a source of supply completely independent of far eastern sources.

CONVEYOR USES WORLD'S LONGEST RUBBER BELT

Ameripol rubber is used in eleven miles of conveyor belting for this limestone and shale conveyor system—including a single flight of belting measuring nearly 12,000 feet, longest ever built. Long length belts help reduce maintenance, labor and equipment costs.

Ameripol is a preferred rubber for the blend used for belting material. It contributes good aging properties, and resistance to wear and weathering.



SALES SERVICE LABORATORY EXPANDS FACILITIES

This Banbury® Mixer at the Goodrich-Gulf Service Laboratory is typical of a full range of processing equipment which helps us duplicate customer factory operations. Thus, problems can be analyzed thoroughly and sound technical recommendations for different recipes, processing methods, etc., can be made. Laboratory services, when you need them, are available through Goodrich-Gulf Technical Service.

If you want additional information on any of these items, or would like to be on the Goodrich-Gulf technical release mailing list, please write Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland 14, Ohio.

Ameripol
THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.

SELECTION GUIDE TO **AMERIPOL**

The broadest line of Styrene-Butadiene Rubber Polymers

NON-PIGMENTED RUBBER

HOT RUBBERS

Ameripol No.	*Antioxidant*	*Characteristics*
1000	Staining	General purpose rubber, easy processing, good aging, for wide range of molded and extruded products.
1001	Slightly staining	General purpose rubber, similar to Ameripol 1000, used where less discoloration is required.
1002	Staining	Similar to Ameripol 1000, exhibits more tack in processing.
1006*	Non-staining	General purpose rubber for light colored and white products.
1007	Staining	Good electrical resistance properties. Reduced water absorption.
1009*	Non-staining	Has little or no nerve in milling, used as a processing aid in other rubbers.
1011	Non-staining	Tackier in processing than Ameripol 1006, used in adhesives, tapes, molded and extruded goods.
1012*	Non-staining	Excellent flow characteristics and high green strength in compounded stocks. Used to increase tensile and hardness in non-black stocks.

*Available in either bale or crumb form.

COLD RUBBERS

Ameripol No.	*Antioxidant*	*Characteristics*
1500	Staining	General purpose cold rubber, better physicals, usually better processing than hot rubbers.
1501	Slightly staining	Similar to 1500, better resistance to staining and discoloring.
1502	Non-staining	General purpose rubber for light colored and white products.
4600	Non-staining	For light colored and white products. Good physicals on aging. Fast pigment incorporation. Reduced Mooney viscosity.

OIL-EXTENDED RUBBERS

Ameripol No.	*Antioxidant*	*Characteristics*
1703	Non-staining	General purpose 25-part naphthenic oil-extended polymer.
1705	Staining	General purpose 25-part aromatic oil-extended, improved processing and aging.
1707	Non-staining	General purpose where higher oil, 37½-part, can be used.
1708	Non-staining	37½-part oil-extended, highly resistant to discoloration and stain.
1710	Staining	Similar to 1705, higher oil level. Easy processing, excellent physicals at lower cost.
1712	Staining	37½-part oil-extended, superior processing.
4700	Non-staining	50-part oil-extended, for greatest economy.

MICRO-BLACK MASTERBATCH

COLD, OIL-EXTENDED TYPES

Ameripol No.	*Antioxidant*	*Characteristics*
4760	Non-staining	75 parts SRF black and 17.5 N oil.
4751	Non-staining	An easy processing polymer with 100 parts FEF black and 50 parts N oil. Applications are low cost extrusion and molded goods.
1805	Non-staining	A low cost tread rubber of 75 parts HAF black and 37.5 parts N oil.
4750	Staining	75 parts HAF black and 37.5 HA oil. Applications include tires, camelback and mechanical goods.
4753	Staining	This 75 parts HAF black and 50 parts HA oil polymer is very suitable for camelback and low cost molded and extruded goods.
4759	Staining	75 parts ISAF black and 37.5 parts A oil. Applications include high quality camelback and tires.
4761	Staining	65 parts SAF black and 37.5 parts A oil. Especially suitable where superior abrasion resistance is needed.

COLD TYPES

Ameripol No.	*Antioxidant*	*Characteristics*
1605	Non-staining	Easy processing extrusion polymer with 50 parts of FEF black also suitable for manufacture of high quality molded goods.
4659	Staining	52 parts of HAF black and 10 parts of HA oil. Used successfully for retreading.
4651	Staining	62.5 parts of HAF black and 12 parts of HP oil. Used in camelback tires and mechanical goods.
4660	Staining	52 parts ISAF black and 10 parts HA oil. High abrasion resistance suitable for tires camelback.

Ameripol
THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.

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RUBBER RED BOOK Directory. Published annually in June. Advertising closing date, April 15. Page $200; Two-Thirds, $155; One-Half, $110; One-Third, $85; One-Sixth, $50. Phone your space order in . . . today.

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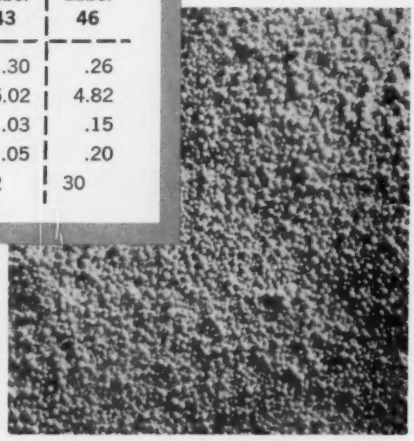
5 ZINC OXIDE GRADES

of *Electronically-Controlled* Purity and Uniformity

Grade	Black Label 20	Red Label 30	Green Label 12	Green Label 43	Green Label 46
Ave. Particle Size D1—Microns	.20	.23	.24	.30	.26
N_2 Specific Surface—Sq. M/gram	10.91	7.04	6.10	5.02	4.82
Acidity as SO_3	.03	.03	.03	.03	.15
Total S as SO_3	.05	.05	.05	.05	.20
Apparent Density—Lbs./cu. ft.	25	28	30	32	30



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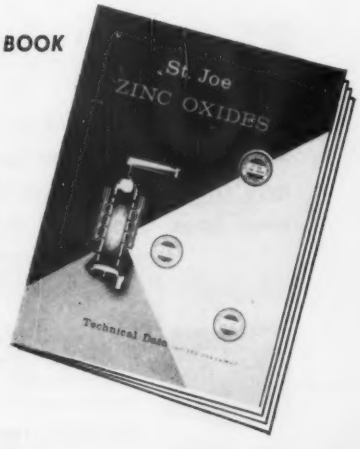

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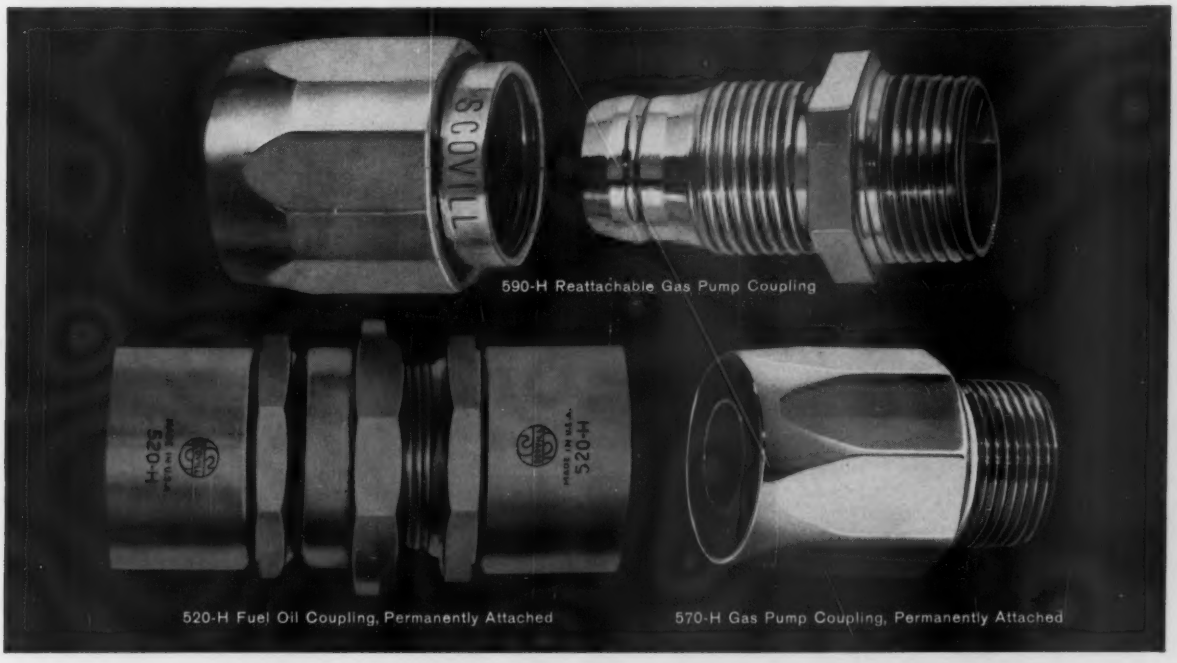

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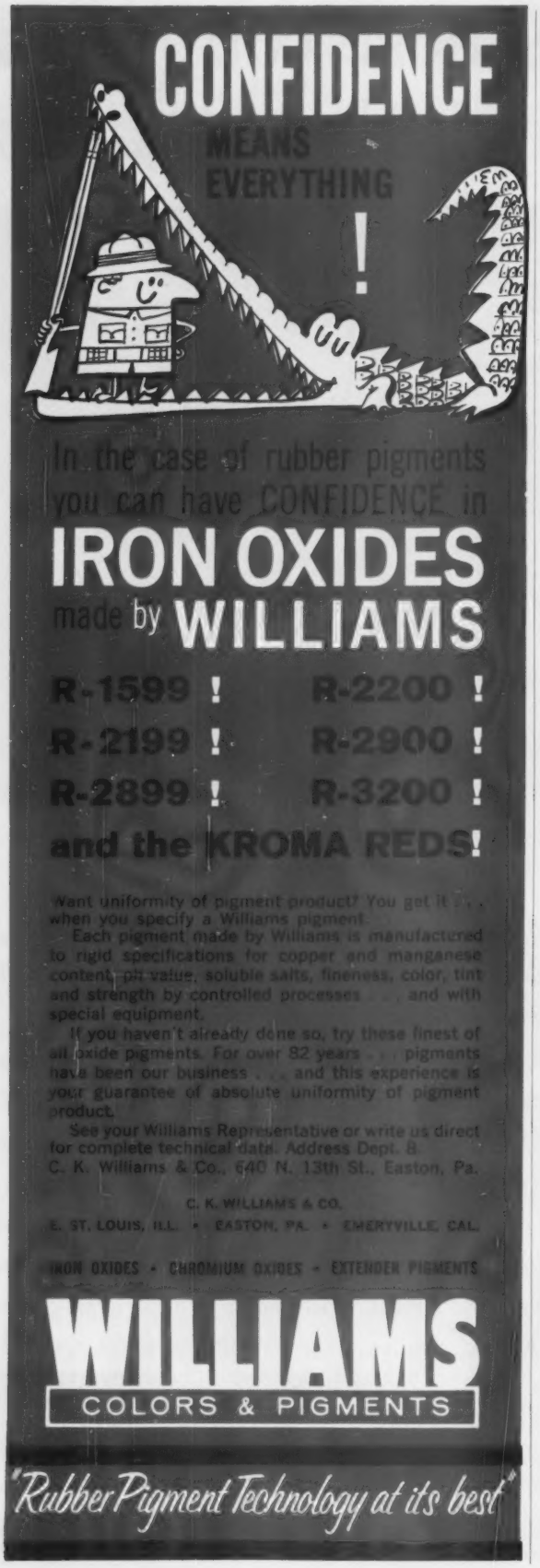
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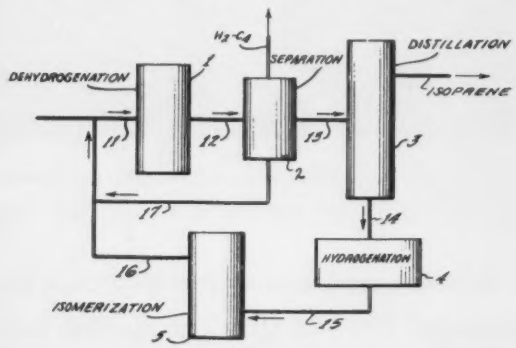
PATENT REVIEW

by Melvin Nord

Preparation of Isoprene

U. S. Patent 2,900,429, issued Aug. 18, 1959 to Heinz Heinemann, Thomas H. Milliken Jr. and Donald H. Stevenson, assigned to Houdry Process Corp., relates to the preparation of isoprene from C_5 hydrocarbons. The patent is particularly concerned with methods for obtaining high yields of isoprene by selective processing especially adapted to the conversion of C_5 charge stocks, which contain C_5's other than isopentane in varying amounts.

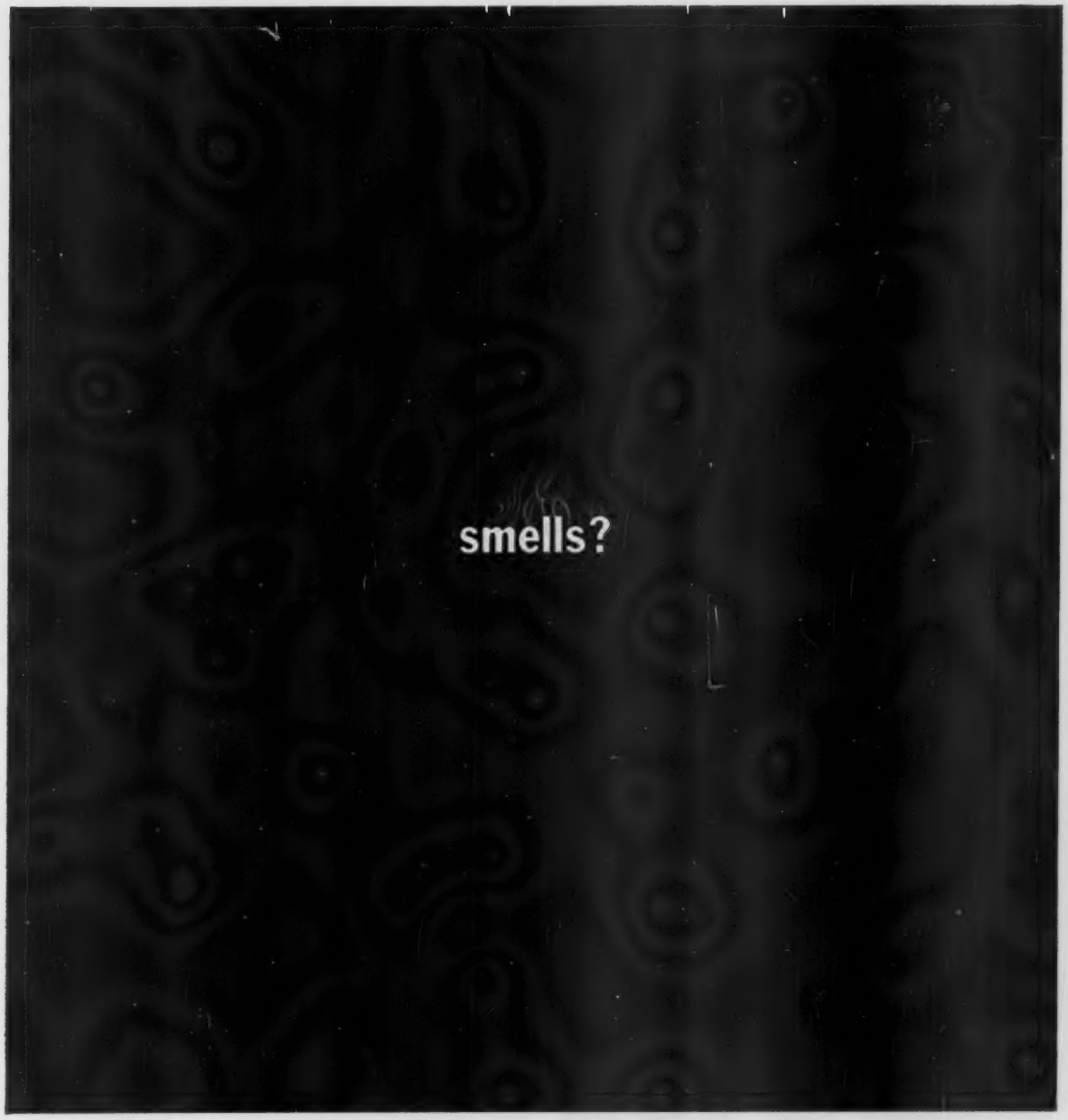
The illustrated flow pattern shows a stream of mixed pentanes and pentenes introduced through line (11) to dehydrogenation reactor (1). The effluent from the dehydrogenation passes through line (12) into separation zone (2). There C_4's and lighter hydrocarbons (to and including hydrogen) are removed as one stream. A second stream, comprising only diolefins, passes through line (13) into distillation system (3). In this system, substantially all of the isoprene is separated and passed to product.



Residual C_5 diolefins, mainly piperylene, are passed through line (14) into hydrogenation reactor (4) for practically complete, selective hydrogenation of piperylene to mono-olefins. Product from hydrogenation is admitted through line (15) into the isomerization zone (5), where normal mono-olefins are selectively converted to isopentenes in respectable yield. The product passes through line (16) where it is commingled with a third stream from line (17) of separator (2), containing saturated C_5's and mono-olefin C_5's. The mixture is returned to line (11) for recycle through the system.

Oil Extended Styrene Rubber

U. S. Patent 2,900,357, issued Aug. 18, 1959 to George W. Ayers and Norman D. Williams, assigned to the Pure Oil Co., provides an oil-



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PATENT REVIEW

extended styrene rubber having unusually low temperature retraction characteristics.

It has been found that highly paraffinic mineral oils may be used as rubber extenders in the processing of synthetic and natural rubbers. More particularly, it was found that a solvent-refined, paraffinic petroleum oil, boiling in the lubricating oil range, is far superior to commercially available aromatic and naphthenic rubber processing oils. This was particularly true for low temperature retraction properties that the oil imparts to high Mooney viscosity styrene rubbers.

According to the inventors, flat spots in the tread, formed as a result of low temperature parking of vehicles, will disappear more rapidly if the tire is composed of rubber, extended with the processing oils of this invention. Tests also show improved wear characteristics of this type of tire.

Production of Cellular Material

U. S. Patent 2,901,774, issued Sept. 1, 1959 to Robert W. Pooley, assigned to U. S. Rubber Co., provides a process for making lightweight, closed-cell, cellular material composed of vulcanized, gas-expanded, homogeneous blend of a thermoplastic vinyl resin, a high-boiling organic liquid plasticizer for the vinyl resin, and a rubbery butadiene-acrylonitrile copolymer.

The principal object of the invention is to provide a more rapid and economical process, which eliminates lengthy heating and cooling periods in the press during pre-molding of the mixture. An ultra-accelerator for vulcanization of the rubbery copolymer is included within the initially infused mixture.

The mixture is shaped in miniature under pressure, at a temperature below that required for evolution of gas from the blowing agent. The miniature is then heated to 300° F., permitting free expansion to decompose the blowing agent, expand the mixture to final form, and effect cure of the rubbery copolymer.

Stabilization of Rubber

U. S. Patent 2,902,466, issued Sept. 1, 1959 to Robert H. Rosenwald and Joseph A. Chenicek, assigned to Universal Oil Products Co., describes a method of stabilizing rubber against cracking.

About 0.001 to 5 per cent by weight of N-N'-di-2-tridecyl-p-phenyline diamine is incorporated in the rubber. This type of diamine is non-toxic. It may be used in rubber which contacts food products. It is also water insoluble, and will not be lost during washing of the rubber with water. In addition, it is non-volatile.

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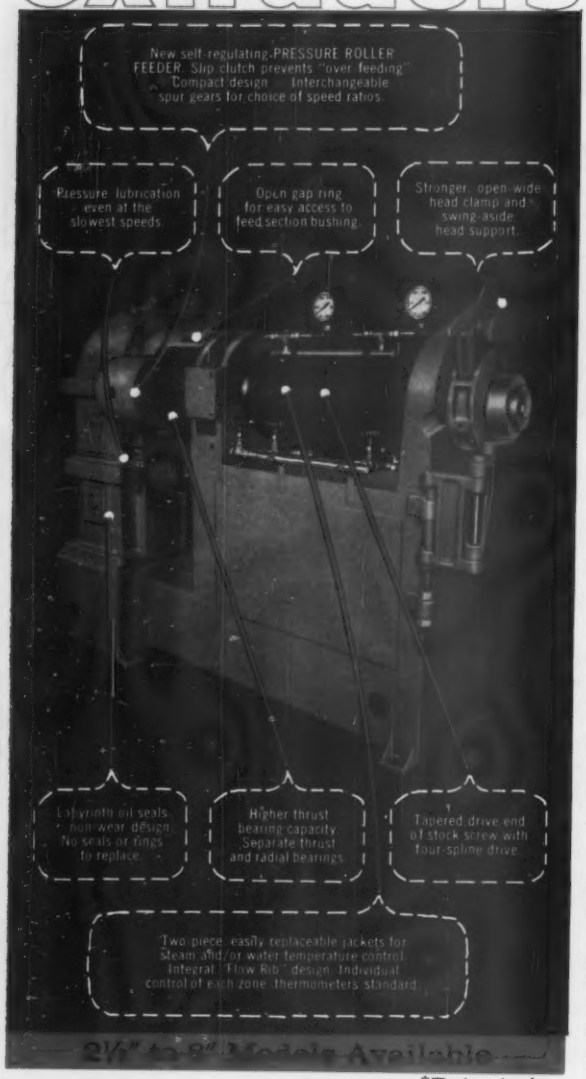
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PATENT REVIEW

Electrostatic Flocking Apparatus

U. S. Patent 2,889,805, issued June 9, 1959 to Herman Freeder, assigned to B. F. Goodrich Co., describes an apparatus for electrostatically flocking or coating fiber particles onto latex gloves, galoshes, overshoes and other products.

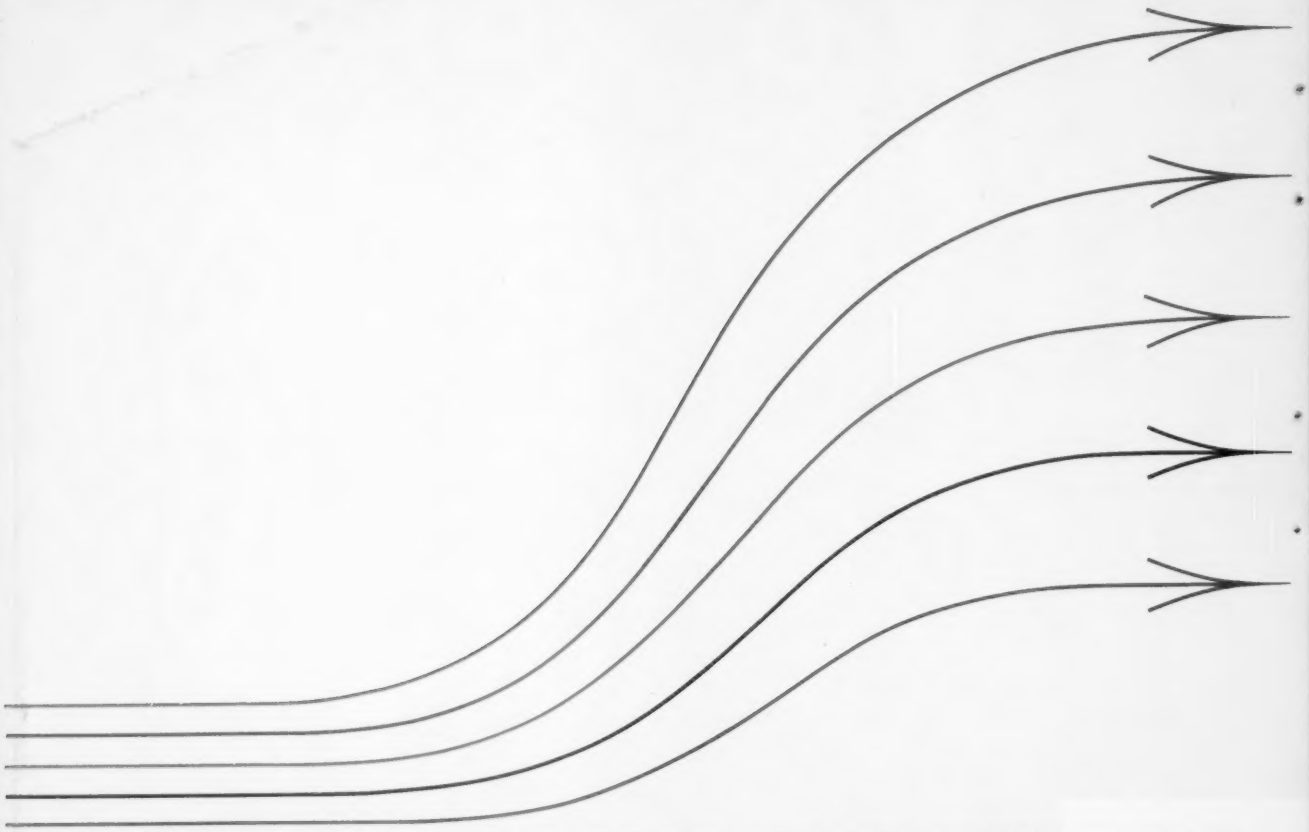
The apparatus is designed to produce uniformly distributed coatings with no appreciable clusters or clumps of fibers. The fiber particles are supplied in a fluid-supported stream at a rate in excess of that needed for deposition. The excess particles pass out of the field of force without being firmly adhered to the articles being coated.

Other Patents of Interest

Subject	Inventor or Assignee	Patent No.	Date
Retreading or recapping of tires	Donald M. MacMillan	2,895,166	7/21/59
Air spring vulcanizing mold	General Tire & Rubber Co.	2,895,168	7/21/59
Sectional vulcanizing apparatus	The Cleveland Trust Co.	2,895,169	7/21/59
Tire construction	Pirelli S.p.A.	2,895,525	7/21/59
Rim for tubeless tire	American Machine & Foundry Co.	2,895,526	7/21/59
Inside curing rim	Donald M. MacMillan	2,896,260	7/28/59
Tire mold	United States Rubber Co.	2,896,281	7/28/59
Antiskid device	George H. Mensch, Jr.	2,896,685	7/28/59
Tire and wheel assembly	United States Rubber Co.	2,896,687	7/28/59
Conveyor belt	Marshall A. Stiltner	2,896,773	7/28/59
Butyl rubber co-vulcanizates	Esso Research & Engineering Co.	2,897,164	7/28/59
Increasing the particle size of synthetic rubber latex polymerizate	United States Rubber Co.	2,897,168	7/28/59
Apparatus for making tires	United States Rubber Co.	2,897,540	8/4/59
Siloxane rubber tube	Dow Corning Corp.	2,897,869	8/4/59
Tire tread surfacing machine	Harry B. Barrett	2,897,882	8/4/59

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.

THE NAME IS REGAL



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Regal is the name of a brand-new family of carbon blacks, developed by the Cabot Research & Development Department and produced world-wide by a new, exclusive manufacturing process from oil. Now commercially available for the first time are blacks which duplicate, and in some cases excel, the performance characteristics of gas-SRF and premium-priced channel blacks . . . blacks which offer properties never before available in oil furnace grades. (Unlike HAF, ISAF and SAF types of oil furnace black, Regal blacks are lower in structure, exhib
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PERFORMANCE CHARACTERISTICS OF 3 NEW REGAL BLACKS

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a channel replacement oil black, combining virtually identical channel black properties with the faster curing rate of HAF types. Comparable with EPC black in modulus, elongation and tensile strength. Regal 300 has actually outperformed channel blacks in wear and tear resistance, cracking and chipping, in passenger car tire and truck tire road tests. Recommended for highway, off-the-road truck and passenger car tire treads, and tread rubber, where service requires typical channel black resistance to tearing, cutting and chipping.

REGAL 600

a brand-new type oil furnace black, giving low hardness and low modulus in passenger car tire treads and tread rubber for quieter ride and better traction properties, combined with the excellent tread wear resistance of an ISAF black. Has outperformed ISAF black in cold SBR, oil-extended SBR, and natural rubber, by giving higher tensile strength and elongation, lower modulus and hardness, lower heat generation, higher electrical conductivity and superior cut growth resistance.

REGAL SRF

a semi-reinforcing furnace black made from oil, is interchangeable with gas-SRF, giving physical properties and processing characteristics equal to gas-produced SRF blacks. Priced the same as gas-SRF. Equivalent modulus, hardness, tensile strength, elongation, tear resistance, resilience and compression set in natural rubber, SBR, butyl, neoprene and nitrile rubber.

Technology scores a breakthrough — as a carbon black producer makes oil furnace carbon blacks with properties never before available

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Cabot introduces these three Regal blacks ...Regal 300...Regal 600...Regal SRF... as the first of a whole family of new type oil furnace blacks. Through this revolutionary new process, the Cabot variety of oil furnace blacks will continue to be extended to include quality grades never before made available. Thus, by adding new blacks to the group being manufactured from oil, Cabot continues to assure an uninterrupted supply of carbon blacks for all purposes, worldwide, from raw materials not subject to the economic pressures affecting natural gas, and at locations where there is no natural gas. Regal is another notable first for Cabot, world's largest producer and seller of carbon black, industry leader for 78 years.

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25-75	2,440 psi	2,200 psi	2,120 psi	2,020 psi
0-100	2,140 psi	2,000 psi	2,000 psi	1,790 psi

Tear strength is high

Ratio of natural rubber to SBR	Tear Strength — 125 Part Loading		Tear Strength — 150 Part Loading	
	Super Multifex	Multifex-MM	Super Multifex	Multifex-MM
50-50	270 pit	240 pit	300 pit	225 pit
25-75	225 pit	200 pit	240 pit	200 pit
0-100	200 pit	175 pit	220 pit	200 pit

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As Ken Soule Sees It

by Kenneth J. Soule

Quick-Replaceable Tire Treads

The Pirelli Co., in announcing their new BS-3 tire with separate and replaceable tread, claims a development comparable in importance to the first fully pneumatic tire.

The carcass, or casing, of the BS-3 tire is made in the conventional way, but instead of a molded tread it has three circumferential grooves covering the face of the tire. The tread rubber is molded onto steel bands of the proper width and diameter to fit into the grooves mentioned above, and mounting of the rings can be quickly and easily accomplished on the deflated casing. Normal inflation locks the tread bands in place.

Different tread design patterns are available for summer and winter driving. It is also possible to insert ice spikes between the tread bands for additional traction in rugged winter driving. These steel spikes are mounted on metal base plates and held in place by pressure between the metal tread rings and the carcass.

The price of the complete tire is said to be approximately the same as that of a conventional tire. Since the cost of three tread bands is about one third of the tire cost, there would seem to be the possibility of considerable saving in tire costs over a period of time. It would also be quite simple (and interesting) to try out new and different tread materials as they became available: for instance for unusual abrasion resistance, or much improved shock absorption properties. We have no data as to the tire sizes or styles available in this country (if any), but no doubt such information could readily be secured as needed.

Misleading Advertising

Considerable publicity is being given to what the Federal Trade Commission terms fraudulent or misleading commercials which have appeared on TV. These have included the lathering up and quick-and-easy shaving of a piece of coarse emery paper; the demonstration of a beautifully symmetrical head on a glass of beer, but, for shame, with the benefit of a liberal slug of soap suds—etc., etc. All very touching, and proof positive that such vicious skulduggery is never again to be allowed to raise its hideous head on the viewing screens of the nation's television sets.

Of course, some people may say that other matters of more serious import might well be undertaken by the F.T.C. Perhaps this is true—let us even grant without any argument that it is true. However, for the present, and until the Commission quits tilting at paper windmills, *here* is one case of false and deceptive broadcasting which they might consider investigating.

The subject in question is the recently publicized practice indulged in by a number of hunters, of making so-called duck "ponds" from polyethylene film. This is done by spreading large sheets of the thin film in open fields in areas where ducks pass on their southbound fall migrations. The reflection of the rays of the sun from the shiny film causes it to look like a small pond of open water, and thus attract the tired and thirsty ducks—to their untimely end. A pretty sneaky performance, it seems to me, and certainly a case of fraudulent advertising, even though our big game hunters will probably say, "It's just for the birds."

What does the F.T.C. say?

The Case of the Pimply Porpoise

Turbulence, or turbulent flow, is a fine thing in its place, but not in the matter of submarines, airplanes, or speedboats. In fact, it has long been known that if a way were found to induce a smooth flow of water or air (as the case may be) around these types of moving objects, their speed could automatically be doubled.

Now, it appears that a means has been discovered to achieve this much to be desired result. The scientist who has solved the problem is Dr. Max Kramer, a German-born missile expert who worked on guided bombs for his homeland during World War II, but more recently has been employed by the United States Navy and Coleman Engineering Co. Dr. Kramer's method of preventing wave formation at the leading edges of ships or planes is to surround these parts in a blanket or skin of specially designed rubber.

Strangely enough, the idea for the design of the rubber layer itself came to Dr. Kramer as a result of a microscopic examination which he made of a piece of dead porpoise skin. This revealed that the skin was composed of a smooth outer layer, held in place by a network of rod like supports which apparently could be manipulated at will to prevent small waves from developing into speed-reducing turbulence. Prior to this time, Dr. Kramer had firmly believed that the secret of the uncanny ability of the porpoise to glide smoothly and swiftly through the water lay in the pimply *outer* surface of the fish's skin.

With this new idea to work on, Dr. Kramer continued his experimentation and was soon successful in proving that the new theory was correct, that the pimples, or more properly the skin roughness, must be beneath the surface, not on top of it. This was done on a small-scale laboratory test using an artificial "porpoise skin" rubber, produced according to his direction by the United States Rubber Co., and named by them Lamiflo. As presently made, this consists of a smooth thin layer of natural rubber, studded on its inner surface with small pillars of rubber. In use the pillared surface is cemented to the object being coated, leaving a series of connected ducts between the object and the smooth outer surface of the Lamiflo. The ducts are generally filled with some viscous liquid such as silicone.

About a year from now, when commercial amounts of the new rubber will be available, we may confidently expect a whole new series of speed records, in the air and on the water—thanks to Mister Porpoise!

As Ken Soule Sees It (Cont'd)

Rubber Footwear—A Cycle

One of the earliest known uses of crude rubber was for the preparation of footwear such as galoshes, boots, or "rubbers." As early as 1731, these were reported by world travelers as being crudely hand-built by the natives living along the Amazon. By 1825, samples of these South American overshoes had been introduced into the United States. Although such "gum boots" could hardly have been things of beauty, they apparently caught the public fancy, for it is said that in the year 1842 the import of this item into the United States totaled about 460,000 pairs. Incidentally, these imported rubbers are reported to have been built on wooden lasts supplied by Yankee traders.

It is hard to say how long this trade continued, but since the rubbers were unvulcanized it seems certain that they did not prove suitable for the extremes of temperature encountered here in summer-winter use. Finally, however, vulcanization proved a life saver for the entire rubber goods industry, including of course, rubber footwear.

If we skip now to the present day, it is probably true that we have three main types of flexible overshoes: (1) the common "rubber," with a cloth (stockinette) lining and a shiny black patent-leather finish (2) the up-to-date version of the Amazon gumboot: the *Galocha Moderna* rubber. This is a dull black, full molded, flexible article produced in Brazil. It is unlined, attractive in appearance, and apparently very well made. (3) The latest entry: a slush molded transluscent "flexible overshoe" of light tan colored vinyl. The sole has an intricate labyrinth type non-skid pattern. The tan color goes well with both brown or black shoes, the black showing through as dark gray or gun metal.

So here we have completed the Amazon cycle, and Brazilian footwear again competes in United States markets. However, now it has rugged competition in a well established "patent leather" finish rubber (which is the cheapest of the three) and an attractive stretch-on vinyl upstart, intermediate in price.

Which will sweep the field? No one can say for sure, until the results of the *gallop poll*, presently under way, are tabulated and analyzed. Then the answer will be self-revealing.

Care to make any bets?

Dr. P. V. C.

The latest members of the plastic family to join the nation's surgical teams are a vinyl adhesive and a polyvinyl film. The pink-colored adhesive is based on Bakelite vinyl resins, and is used in spray form as Vi-Hesive surgical adherant. The light gauge, transparent sheet, trade marked Vi-Drape surgical film, utilizes Krene polyvinyl film.

In operative cases, the usual preliminary scrubbing, cleansing and disinfecting of the wound area are still meticulously carried out. However, in the present modified method, the next to the last step before the incision is to spray the operative region with the Vi-Hesive material. This dries in about thirty seconds, leaving a tacky surface. Over this area, the previously sterilized film is then smoothed on to fit the contours of the body.

By the use of the film technique, it is claimed that the need for awkward and troublesome towels and metal clips is eliminated; also, that positive asepsis is much easier to achieve and to maintain. As supporting evidence, a recent article in the *American Journal of Nursing* reports that this film procedure was used in 291 operations during a five-month period without a single post-operative infection developing. (This apparently is considered to be an exceptionally good record.)

So, my friends, let's hope that no surgical operation comes your way in 1960. But if it does, and the good surgeon wants to vinyl spray and film wrap you, be doubly happy. Remember that your chances of a trouble-free recovery are being multiplied manifoldly. Think also, how beautiful and carefree many of the butterflies and moths are as they finally flutter free from their plastic cocoons. No reason at all why you cannot do as well!

Painless Publicity

The rubber industry should be vitally interested in a film production which was scheduled to begin appearing on American TV screens some time after February 15, 1960. The picture deals with the war-born synthetic rubber program, and its spectacular expansion and growth under private ownership after the war. The importance to our national defense of the myriad of rubber products produced, as well as the subsequent saving to consumers through improved goods at reduced prices is clearly shown.

As outlined in a publicity release from the Rubber Manufacturers Association, the film is one of the "Industry on Parade" series put out under the auspices of the National Association of Manufacturers. It is expected to be shown on about 265 television stations in the forty-two states in which rubber factories are in operation. Although February 15 was listed as the approximate kick-off date, the actual time in various localities will vary greatly and quite likely initial showings will be spread over a two- or three-month period.

Another means of increasing the audience coverage will be the showing of the film at twenty overseas information centers operated by the United States Information Agency, and at twenty-five stations overseas through the cooperation of the Radio-TV section of the Department of Defense. It is hoped that many rubber companies will buy copies of the film (at $35 each) to be shown as often and as widely as they see fit in their own localities.

This sounds like an admirably planned and well executed project. It is to be sincerely hoped that the TV coverage will be equally good, both as to favorable time spots and station facilities. At any rate, the showings certainly will be free from one of the banes of so many present-day programs, namely *canned laughter*, whether "technically augmented" or not.

I shall keep watching for this TV rubber special, and I hope you will, too.

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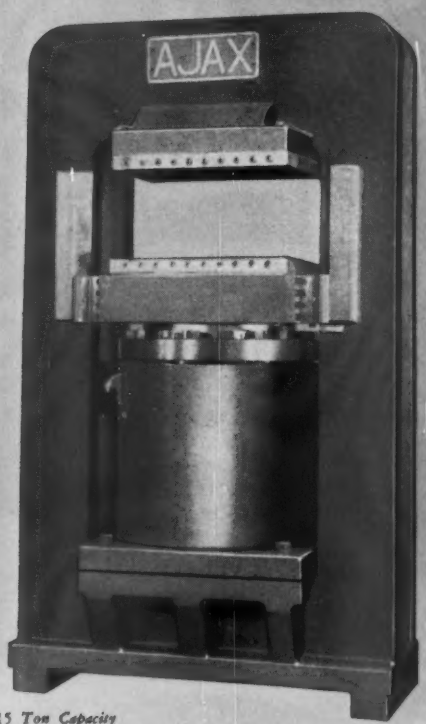

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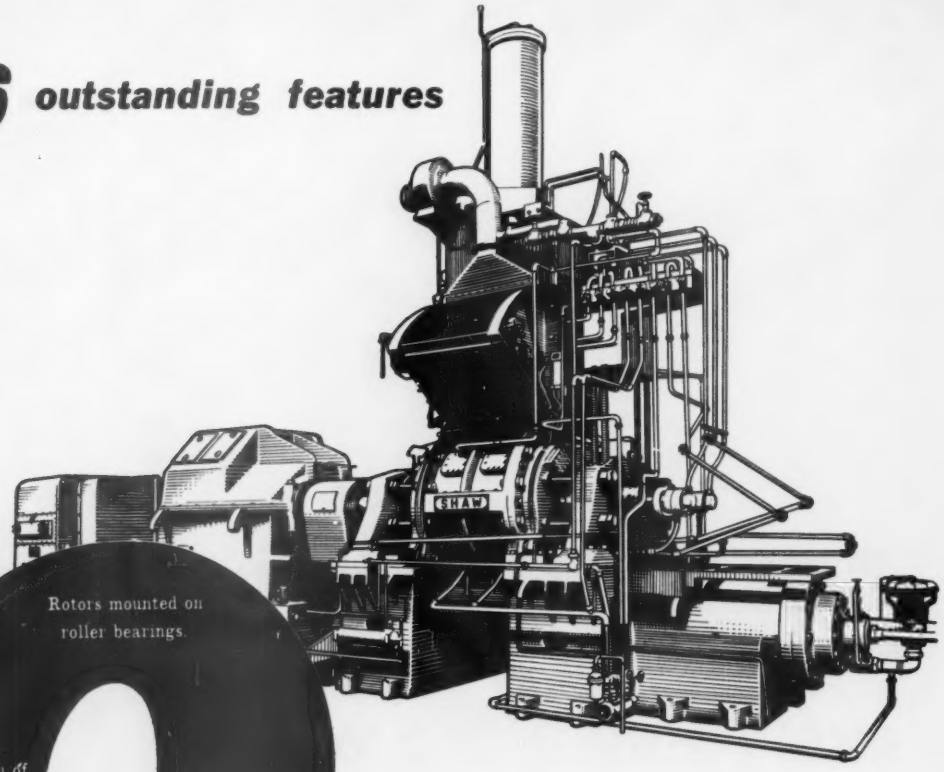

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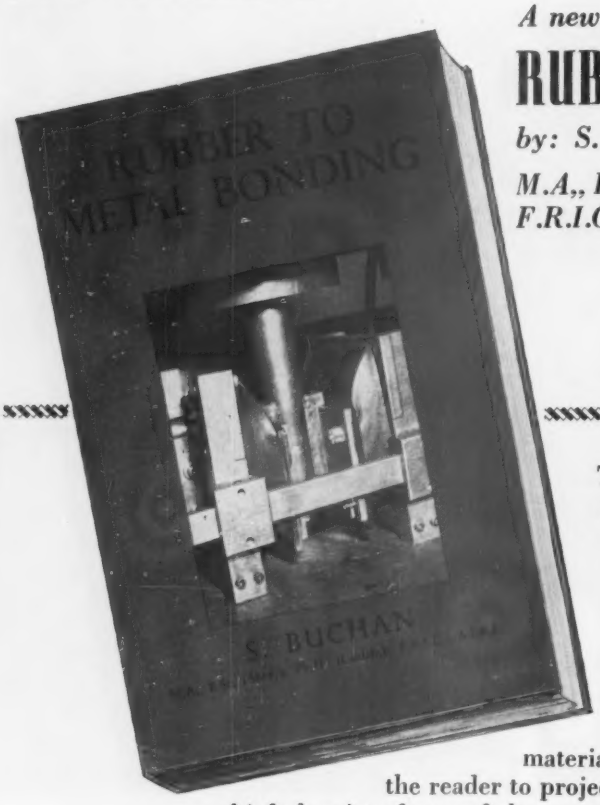

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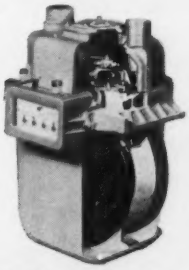

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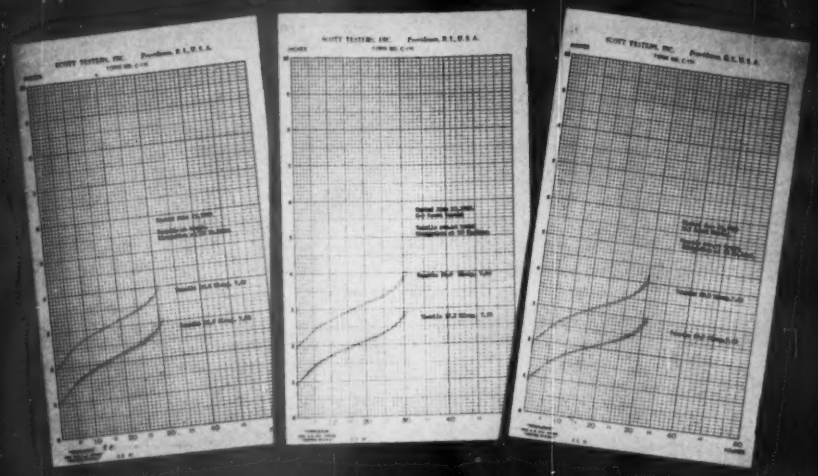

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• The best way to acquire a thorough knowledge of Western European developments is to visit one of the forthcoming European trade fairs, particularly the German fairs. The International Housewares and Hardwares Fair was to have been held in Cologne from March 11 to March 14. More than 1300 manufacturers were expected to exhibit in an area of 950,000 square feet. Last year 60,000 people attended this fair. Similar to the American Housewares and Hardwares shows, the fair enables visitors to observe new developments in many fields. Moreover, a number of technical manufacturing processes can be studied.

From April 24 to May 3, 1960, the German Industries Fair, will take place. This is considered the show place of the European Common Market. It is also Germany's largest fair for industrial and consumer goods. There will be 4,700 exhibitors, 825 from foreign nations, which will occupy 4,200,000 square feet.

More than 1 million people are expected to visit this show. It is considered that this exhibit is a review of Western European industry because a major part of the members of the European Common Market will participate. Additional information concerning the fair may be obtained from the German-American Chamber of Commerce.

• E. I. du Pont de Nemours & Co., Inc., and a Japanese firm, Showa Denko, a leading producer of fertilizers, have submitted to the Japanese Ministry of International Trade and Industry plans for a $6.5 million joint venture for the production of neoprene. According to current reports, DuPont will have 50 per cent ownership and will give technical aid. Initially, the joint subsidiary will produce for the Japanese market. The Ministry of International Trade and Industry is expected to approve the venture and to ease the usual 30 per cent limit on foreign holdings in a Japanese company. The Ministry is also urging the Finance Ministry to liberalize foreign investment.

• Japan Synthetic Rubber Producing Co., which has a facility at Yokkichi in central Japan, has begun the production of synthetic rubber. The unit has a capacity of about 30,000 tons annually and within the next five years, capacity is expected to be increased to 45,000 tons annually. Beginning in April, the unit will also manufacture butadiene at the rate of 33,500 tons per year.

• Australia's first carbon black production facilities have been completed, according to the United Carbon Co. The facilities have an initial capacity of 30 million pounds and are expected to be able to supply all of Australia's current oil furnace black requirements. Previous to this, Australia imported about 16,000 tons of carbon black annually.

• Swedish Goodyear Gummi Fabriks Aktiebolag plans to expand its motor tire producing facility at Noorkoeping. The market for tires in Sweden has been growing steadily and in order to meet increased demand, the existing factory building will be expanded at a cost of about 4.5 million Swedish crowns. Machinery and equipment is expected to cost approximately 5.5 million crowns.

• Synthetics and Chemicals Ltd. of India, a newly formed Indian corporation, of which Firestone Tire & Rubber Co. is a partner, has been granted a loan of 27,100,000 Indian rupies ($5,700,000) from the Export-Import Bank of Washington to help finance a new synthetic rubber plant in that country.

• Chemische Werke Huels, Marl, West Germany, is now producing a new synthetic rubber under the name of "Polybutadien." The new product will not compete with the other types of synthetic rubbers, primarily cold rubbers, produced at that factory. It will partly replace natural rubber, which has to be imported. Elaborate tests have shown that tires made from a mixture of Polybutadien and natural rubber are much more resistant and generate much less heat than regular tires.

Even when used in the manufacture of very large and giant tires for trucks and earth moving equipment, the results of the tests conducted were excellent. The first samples of the polybutadien rubber will be shown in the early part of spring. It seems that the factory attaches great importance to this discovery. Similar press notices have been printed in many German newspapers, and also in a number of Belgian and French newspapers.

On the Continent (cont'd)

• An editorial in the January issue of *Plastics,* published in London, England, is devoted to a review of the sensational success and expansion of the British plastics industry. The editor states that to produce 500,000 tons of plastics materials, volumetrically equal to 3,500,000 tons of steel, is to register an impact that cannot be overlooked. He goes on to state that trade to foreign countries has expanded. Addressing himself to manufacturers of materials and equipment, he emphasizes that British trade with Eastern Europe is of particular importance.

England now makes 23 per cent of the world's exports to these territories, the editorial states, while in 1956, British exports to these countries was only eight per cent. Discussions with Russian authorities and others have convinced Britain that despite the difficulties, there is in Eastern Europe a vast and as yet unsatisfied demand for equipment and materials. This is believed to be an opportunity of great dimensions for the British plastics industry, more particularly because of her reputation for soundly constructed machines and well evaluated materials.

The editorial states that here is an opportunity for order books to grow fat, but England must not permit delivery dates to grow in similar proportions. If money is needed for expansion, it will not be found wanting, the author advises, but England should be determined and aggressive in her approach to this new market, for her competitors will not stand by idly.

Another paragraph of this column describes what happened to other industries. About a year ago, England perfected a new process for manufacturing plate glass or flat glass and increased exports of this material are expected. However, England might be surprised to learn that people behind the Iron Curtain are able to undersell them regardless of cost because in the Communist world, selling prices are not established as they are in Western Europe and the United States, but are considered political weapons.

Sweden and Austria are already suffering as a result of the cut-rate prices of glass manufactured by Russia or the satellite countries. Several months ago, this column took issue with a British colleague, Mr. Greenwood, who complained that Americans block the delivery of rubber machinery to the Iron Curtain countries and he was quite vehement about it. It is interesting to point out that the entire column has been reprinted in several magazines, for instance, in *The Planter,* the official magazine of the Society of Planters, published in Kuala Lumpur, Malaya.

A Mexican colleague, the editor of *Hule Mexicano y Plasticos,* published in Mexico City, agreed with the opinion stated here and printed the part of the column which dealt with the English protest concerning American reluctance to deal with the Soviet Union and her satellites.

An economic offensive with Russia and her satellites should be expected before long. Whatever machinery and materials are bought, in the meantime, will be used to be copied and to improve the capacity of the Communist bloc. When it is to their advantage, they will not hesitate to fight up by dumping tremendous amounts of merchandize at unbelievable prices on the world market in an attempt to destroy the core and the backbone of our free society. They do not have to shoot rockets at us. If we let them take the offensive by supplying merchandise at low prices, we will be out of business before long.

• In the French publication, *Revue Generale du Caoutchouc,* C. Ortlieb discusses the polymerization of butadiene by lithium, which was recently the subject of two United States and one French patent claims. The author describes the way in which the catalyst is prepared and gives recommended proportions. It seems that the gel content of final polymers increases with temperature and decreases when a greater amount of catalyst is used. On the other hand, viscosity is lower when the temperature is decreased or the catalyst concentration increased. Study shows how the lithium concentration affects the polymerization speed, the gel content and the molecular weight.

• The International Fair at Hanover will take place this year from April 24 to May 3 in nineteen exhibition halls covering an area of more than 2,750,000 square feet. More than 5,000 manufacturers, with 800 factories from all parts of the world included, will participate in this technical cross-section of the latest developments. An important section, "Chemistry, Plastic and Rubber", will be of particular interest to the rubber industry.

• One-hundred and eighteen leading American corporations have opened branches or have organized international companies in the European Common Market. Seventy of these corporations have been established in Germany; 60 in France; 36 in The Netherlands; 34 in Italy; and 27 in Belgium. Four American companies have branches in all six countries of the European Common Market, while five have headquarters for Europe in Italy; six in Belgium; nine in The Netherlands; 11 in France; and 22 in Germany.

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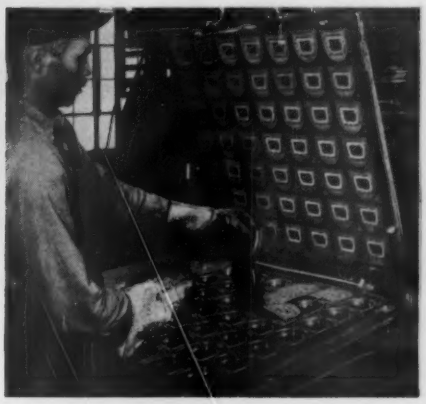

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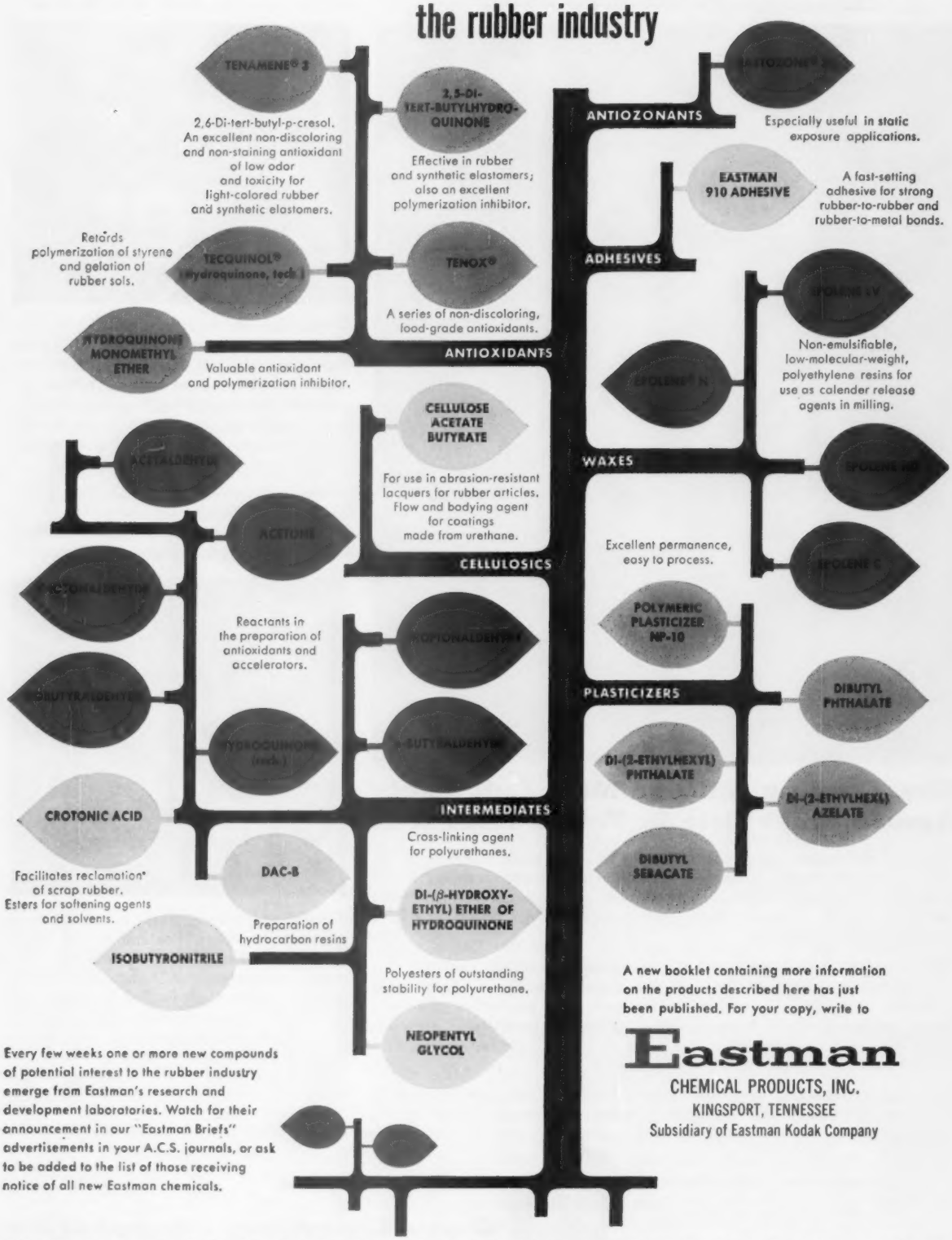
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Polyesters of outstanding stability for polyurethane.
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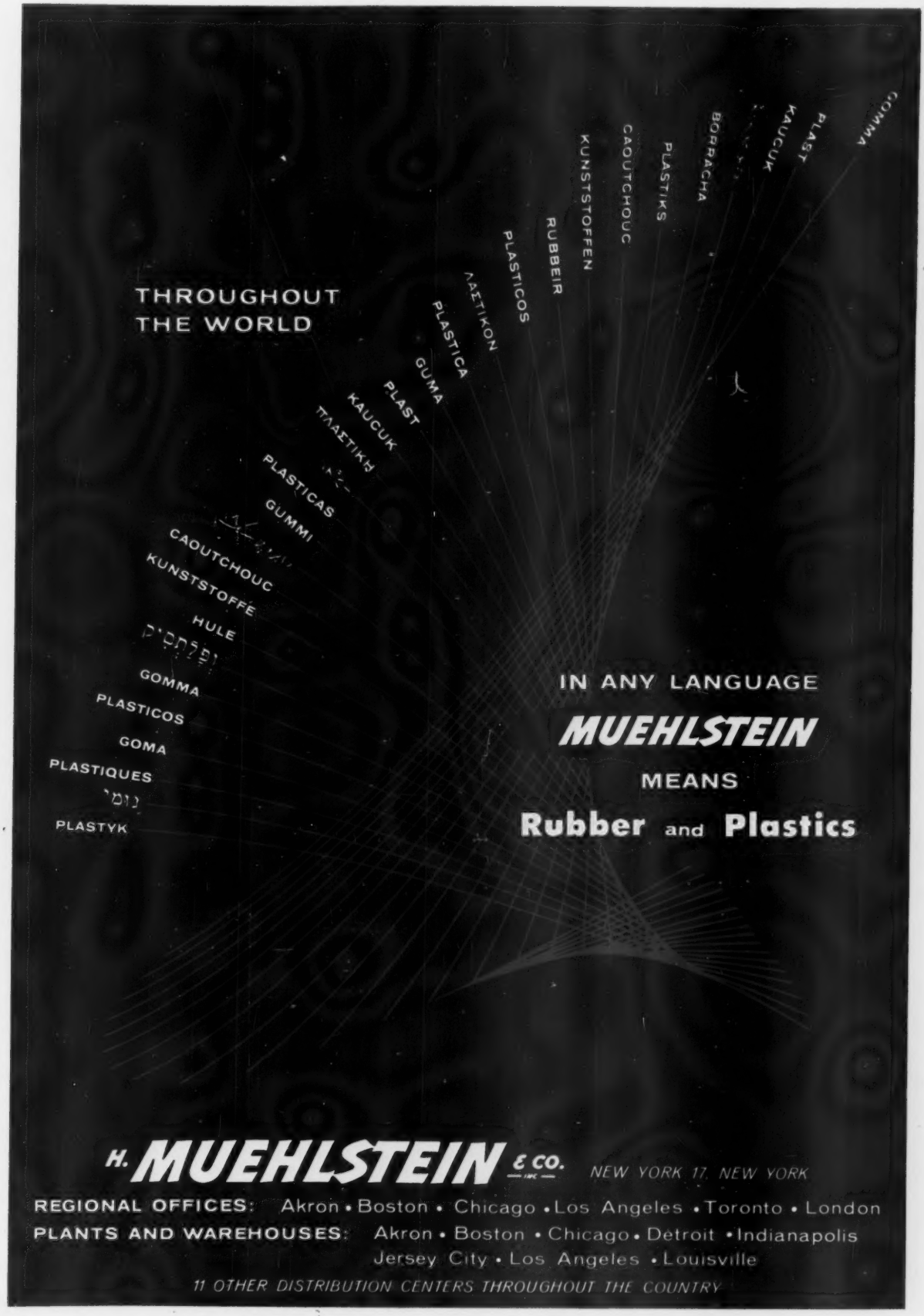
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Stainless-steel hopper, vari-drive motor and control panel make the new Midget Banbury a complete unit that will produce mixes comparable with those obtained in production-size machines.

New midget Banbury

broadens Farrel line of laboratory mixers

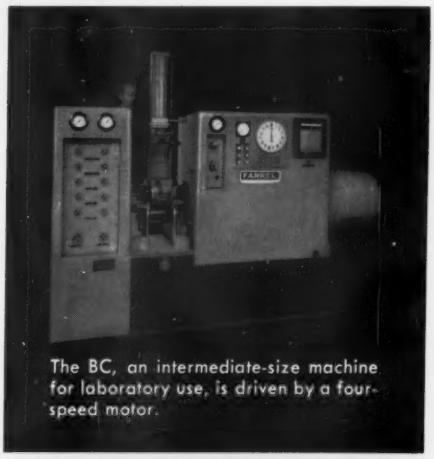
With the introduction of the newly designed Midget Banbury® mixer, Farrel's line of equipment is as broad as your requirements.

Thanks to a 7½ HP, vari-drive motor, giving any long-rotor speed from 45 to 336 RPM, the Midget is a truly versatile mixer, permitting a broad scope of experimental work. It will mix smaller batches than the other two laboratory sizes and is, hence, ideal for working with high-cost raw materials or for color matching.

Also, the Midget requires only minor modifications to make it suitable for unusually high temperatures—up to 600°F for circulating-oil system, and for stock temperatures up to 800°F.

Standard design features include a pneumatically operated front swing side and a stainless-steel hopper with 3" diameter air-operated floating-weight cylinder. The complete unit is mounted on a fabricated-steel bedplate.

Ask for details of any of the laboratory Banburys shown here.



The BC, an intermediate-size machine for laboratory use, is driven by a four-speed motor.

The OOC is the largest of the laboratory mixers. It is furnished with a two-speed drive.

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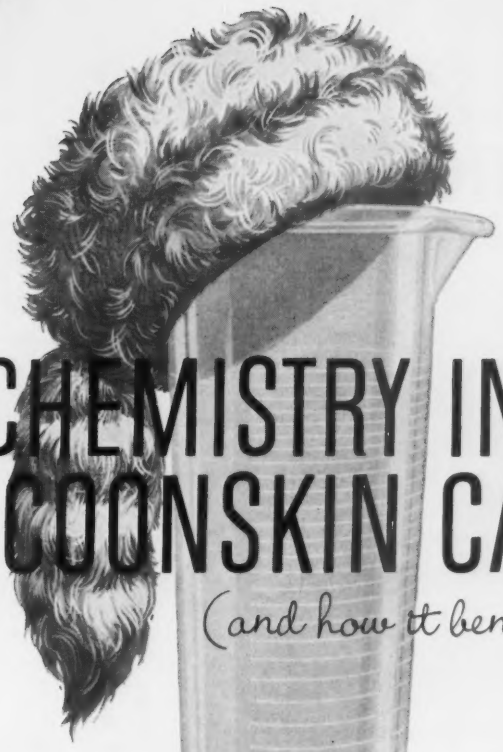

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a hydrogenated stearic acid that has set quality standards for the industry ever since. A lot of rubber firms buy it from us regularly. For old times sake? Not on your life! For better products sake. Longer shelf and use life. Higher sales volume. Happier customers.

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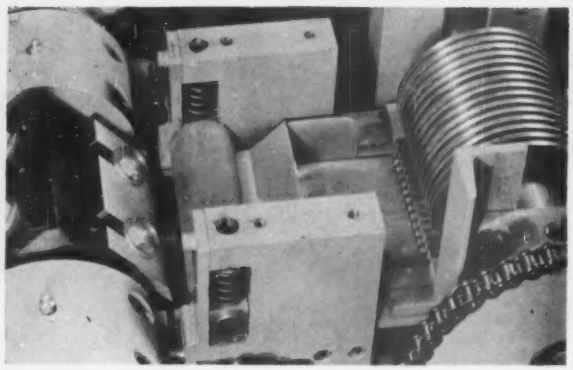
How to dice rubber, natural and synthetic, for AUTOMATION



You don't have to cut rubber, carry it around in carts, and deliver it to machines.

Now you can dice it onto a conveyor belt and deliver it directly to extruders or molding machines.

Such automation speeds up plant operation, cuts costs.

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Overseas

Jerusalem—The Israeli government is considering a project to establish a synthetic rubber plant near the Haifa oil refineries. The plant, to have a capacity of 15,000 tons of synthetic rubber annually, will require an investment of about $12 million. A group of American investors are ready to invest $4 million in the project.

Canberra—Goodrich Chemical Co. and C. S. R. Chemicals Pty., Ltd., Sydney, Australia, are joint owners of a plant now under construction at Altona, near Melbourne, for the production of Geon vinyl plastic materials The $4.5 million facility is scheduled to start operations in 1961.

London—International Synthetic Rubber Co., a consortium of eight rubber companies in Great Britain, plans to increase the capacity of its Hythe plant, near Southampton, from 70,000 to 90,000 long tons per year of butadiene-styrene type rubber. The organization is also constructing a plant for the production of about 7,000 long tons annually of synthetic latex for automobile upholstery.

Bonn—A new synthetic rubber process that yields castable polyurethanes has been introduced by Farbenfabriken Bayer, A. G., Leverkusen, Germany. In the first step, diisocyanates react with linear polyhydroxy compounds such as glycol-adipic acid polyesters having molecular weights of 1,000-3,000. In the second step, the product diisocyanate-polyester reacts with glycols at about 100°C to yield the cross-linked rubber.

The Hague—Dow Chemical International, Ltd., S. A., plans to construct a new butadiene-styrene latex plant in Rotterdam. The plant will be built and operated by Dow's wholly-owned Dutch subsidiary, Nederlandsche Dow Maatschappij, N. V., at the site of its terminal and warehousing facilities in the Third Petroleum Harbor at Rotterdam. Investments in the installation amount to more than 7⅛ million Dutch guilders ($2 million). Completion of the unit is scheduled for early spring 1961.

Lisbon—Production operations are now underway at a new Firestone Tire & Rubber Co. plant in Portugal. The plant, known as Firestone Portuguesa, is located in Alcochete, 10 miles east of Lisbon. Annual production capacity is expected to reach 120,000 truck and passenger car tires tubes. The company was formed by Firestone with Portuguese bankers and industrialists.

Take a long look at Jefferson's new polyethers and foam catalysts for the urethane industry

Jefferson Chemical has in commercial production a line of high quality polyethers which you are urged to evaluate in your particular urethane processes. Currently available are reactive intermediates in the molecular weight range of 400 to 3000. In addition, diethylene glycol is available for use in polyester-based flexible foams.

All are made to rigid urethane specifications with emphasis on low unsaturation, low water content, low ash, low acid numbers, and controlled pH. With one or a combination of these Jefferson polyethers in your formulations, desirable resilience, compression set, and compression deflection characteristics can be obtained.

Jefferson is also your best source for commercial quantities of N-methylmorpholine and N-ethylmorpholine which are excellent catalysts for the preparation of flexible, semi-rigid and rigid urethane foams.

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Make Jefferson your partner in developing better urethane products. For complete technical information and samples of these new reactive intermediates and catalysts . . . contact Jefferson Chemical Company, Inc., 1121 Walker Avenue, P. O. Box 303, Houston 1, Texas.

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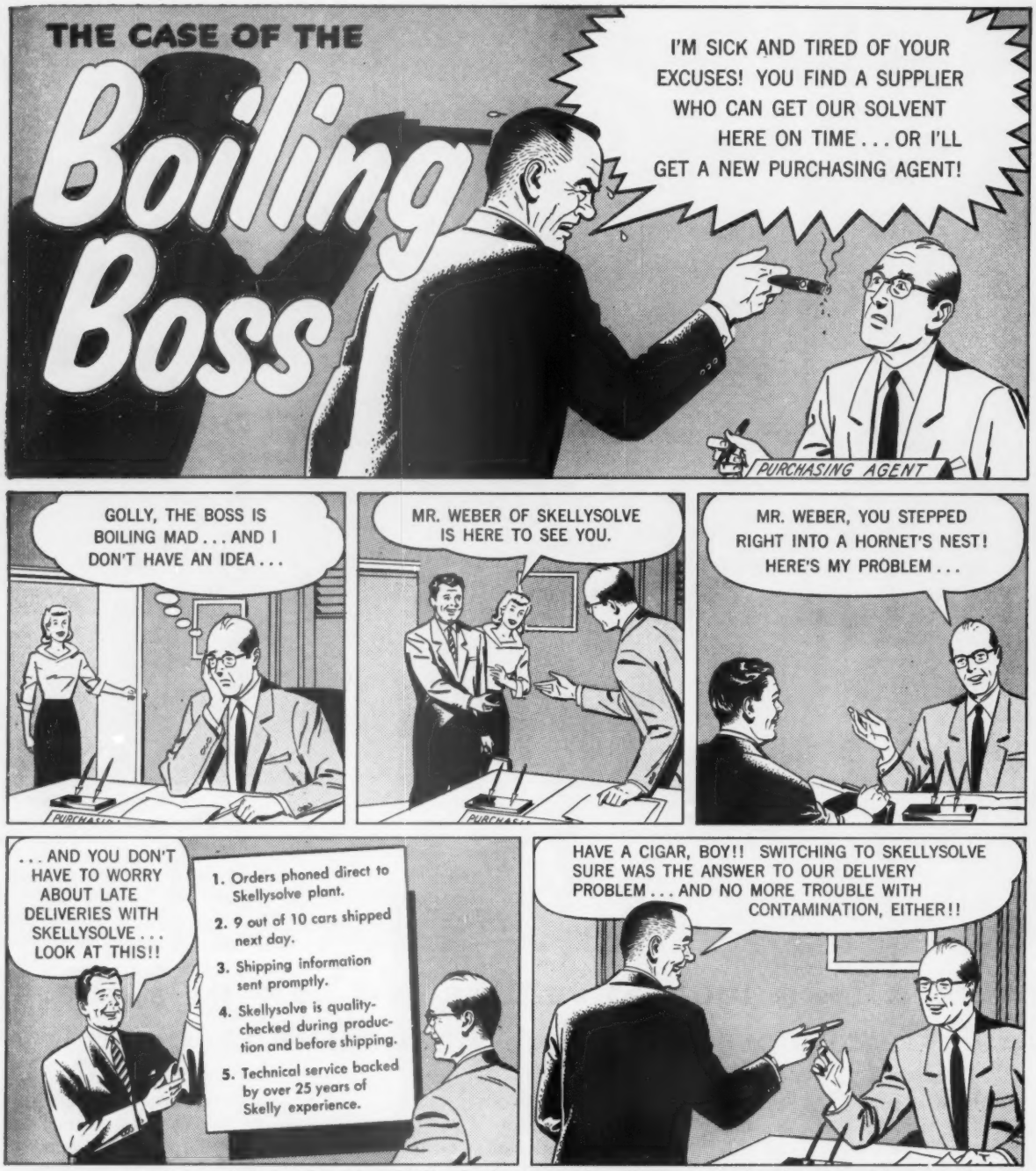
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I'M SICK AND TIRED OF YOUR EXCUSES! YOU FIND A SUPPLIER WHO CAN GET OUR SOLVENT HERE ON TIME . . . OR I'LL GET A NEW PURCHASING AGENT!
PURCHASING AGENT
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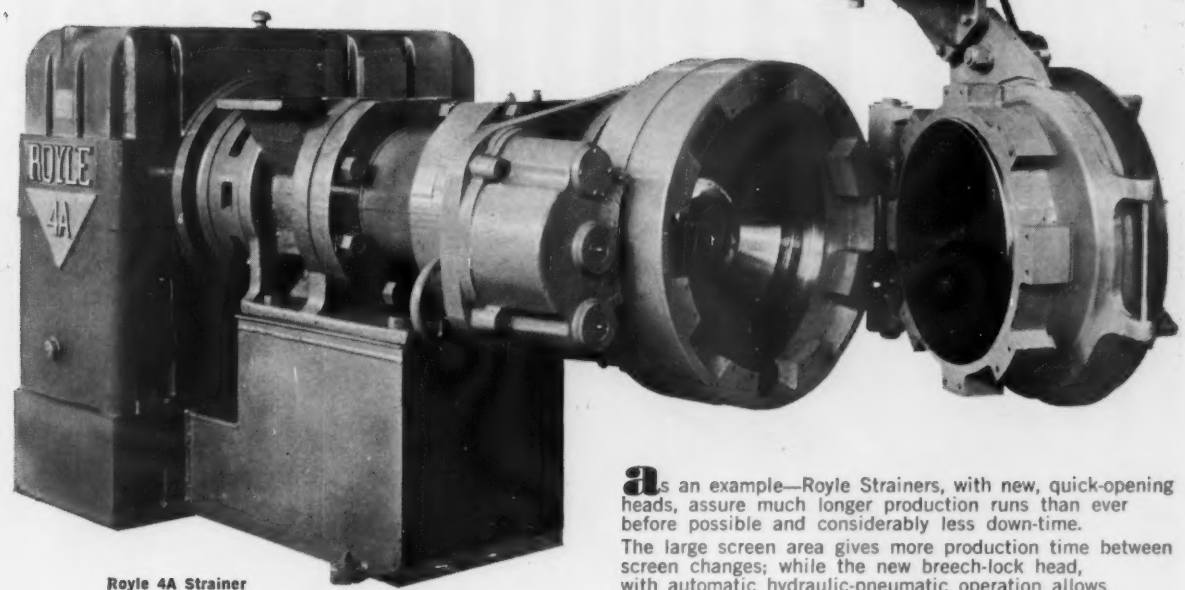
ROYLE STRAINERS MEAN RUBBER PROFITS



Royle 4A Strainer

As an example—Royle Strainers, with new, quick-opening heads, assure much longer production runs than ever before possible and considerably less down-time.

The large screen area gives more production time between screen changes; while the new breech-lock head, with automatic hydraulic-pneumatic operation allows for quick screen changes.

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Heavy Duty Gear Case—with self-lubricating, opposed helical gears that were Royle designed and engineered specifically for strainer operations.

Powered Cut-Off Knife—with either rotary or up-and-down motion and adjustable cycling to give variable length products.

Longer L/D Ratios—allow mixing operations to be performed in the extruder. This gives a continuous and, hence, more economical mixing method than other operations.

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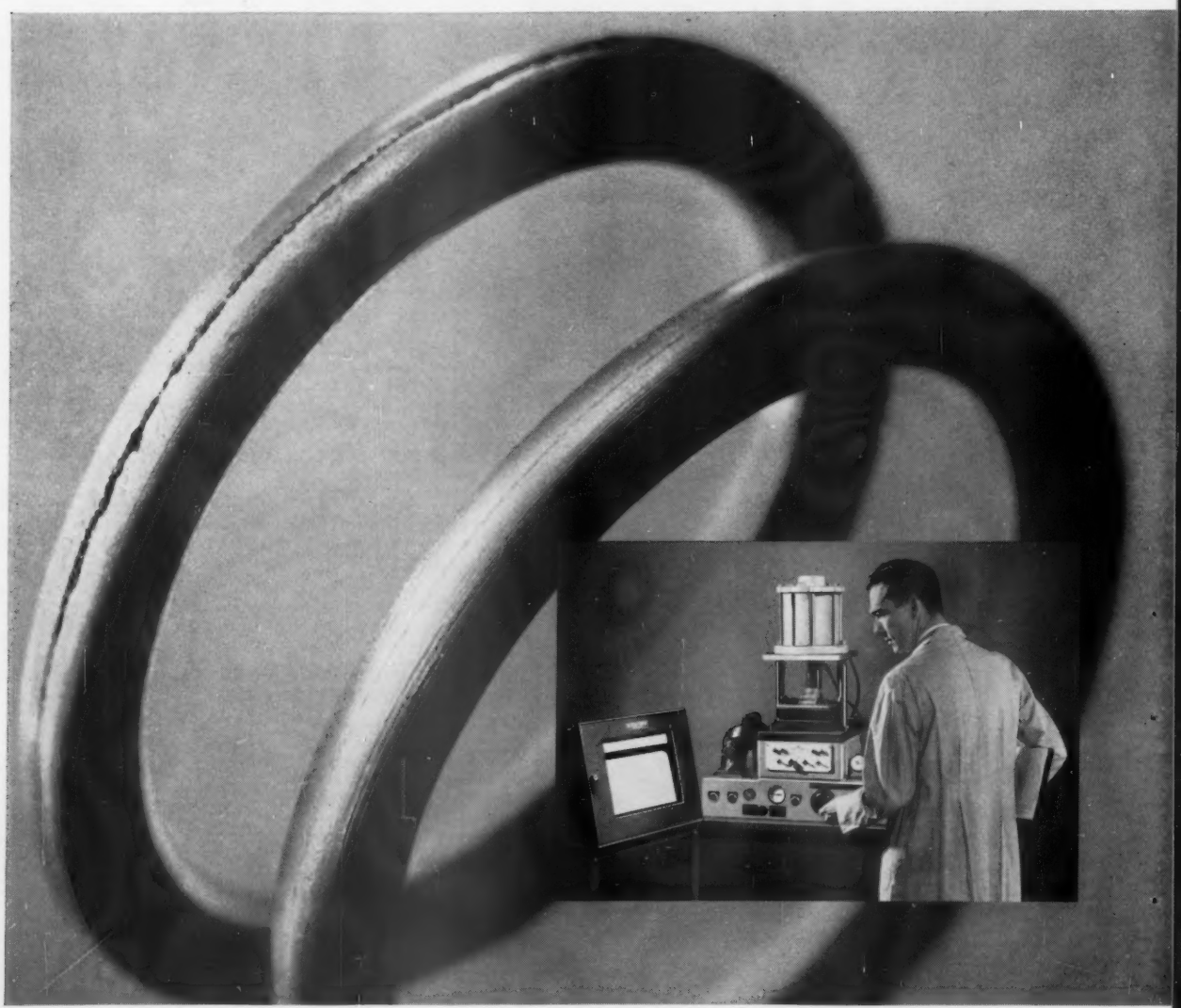


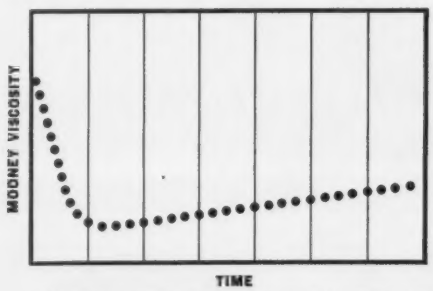
FLUOREL 2141 "O" ring, bottom. Note freedom from defects because of the improved scorch characteristics of FLUOREL Elastomer "O" ring as opposed to elastomer at top of photograph. Inset, FLUOREL 2141 undergoing Mooney Scorch Rating Test.

in elastomers...

Its Mooney Scorch Rating is ideal for the fluorinated rubber processor because it makes possible fast, more economical cures with fewer defects, less scrap, fewer rejected parts. Material can be reprocessed with greater safety.

A significant breakthrough in elastomer processing has been made possible by 3M Research through development of its new FLUOREL 2141 Elastomer.

This remarkable new product has a Mooney Scorch Rating outstanding among fluorinated elastomers. The range per-



Mooney Scorch Curve for FLUOREL 2141 Brand Elastomer.

mits the rubber processor to achieve fast, more economical cures with fewer defects, less scrap and fewer rejected parts. The inherent safety of FLUOREL Elastomer 2141 allows repeated reprocessing to produce high quality parts that meet military specifications or other critical end uses.

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If you use or work with elastomeric materials, it will pay you to examine the remarkable features of this new product. Examine, too, your present rubber products with an eye toward increasing their life and quality through use of FLUOREL 2141 Elastomer. For complete data, write today on your company letterhead to: 3M Chemical Division, Dept. KCC-30, St. Paul 6, Minnesota.

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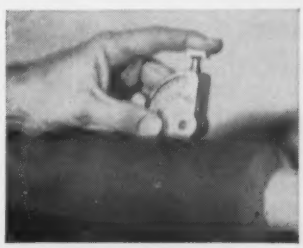

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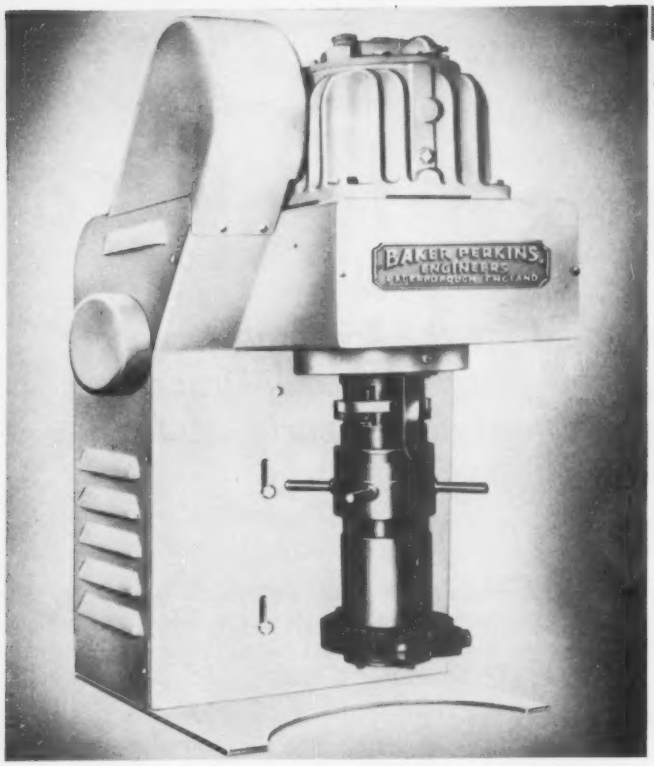

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Latest studies in Pennsalt's Rubber Sales-Service Laboratories show that Pennox antioxidants C and D effectively protect latex from staining when exposed to atmospheric oxides of nitrogen, and minimize discoloring of fabrics coated or used in contact with latex products. Tests covered the performance of Pennox C and D, two other substituted phenolic-type antioxidants and, to demonstrate the behavior of an amine-type, Pennox A. Test fabrics used in this study included nylon, acetate, cotton, silk, worsted and viscose. Complete data are now available in Bulletin S-160. Write for your copy. Industrial Chemicals Division, PENNSALT CHEMICALS CORPORATION, 3 Penn Center, Philadelphia 2, Pa.

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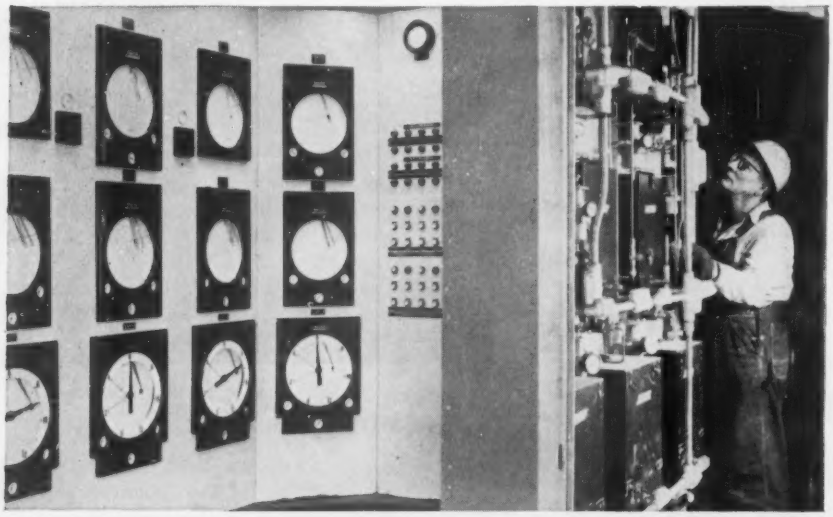

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Soviet Rubber Technology

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A cover-to-cover translation of the monthly Russian rubber journal, "Kauchuk i Rezina". Prepared by the Research Association of British Rubber Manufacturers, in collaboration with Maclaren and Sons, Ltd. Distributed exclusively by Rubber Age in the Western Hemisphere. Deals with the efficient use of raw material, the automation of manufacturing processes in the rubber industry and improvements to the design of tires and industrial rubber goods. Articles describing the most important chemical research of interest to the rubber industry are also included.

Although it has been obvious in recent years that Soviet rubber technology and research is very vigorous and highly advanced, it has been extremely difficult because of the language barrier for those in Western countries to follow the technical progress being made there. This, in spite of the fact that the Russian rubber journal is a prolific source of original literature on the subject.

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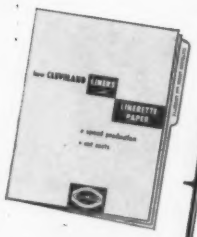

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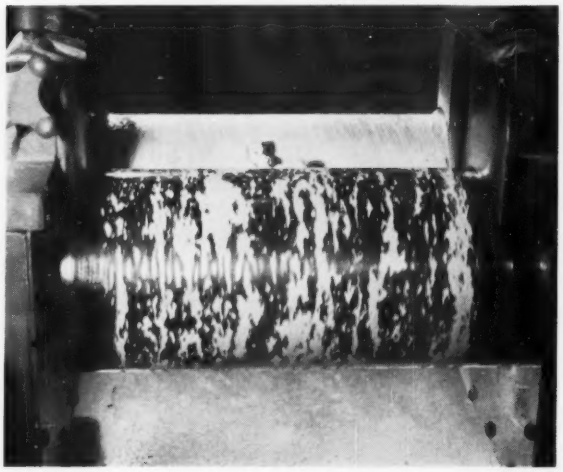
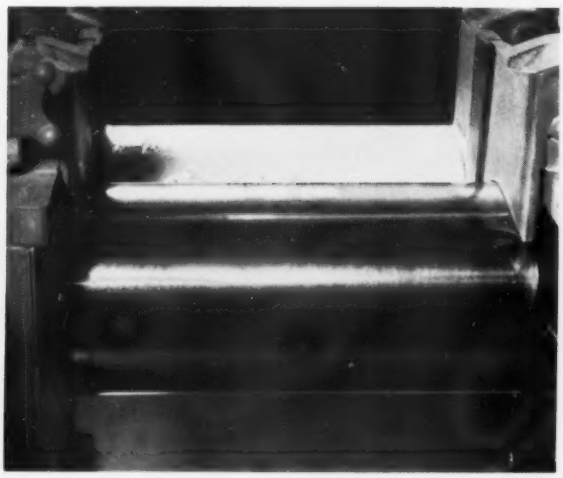


(Above)—Typical back-roll build-up caused by poor accelerator incorporation. (Below)—The same equipment after a run with Cyanamid's new MBTS. Both pictures taken 2 minutes after start of dispersion cycle. Mill temperature, 60°C.



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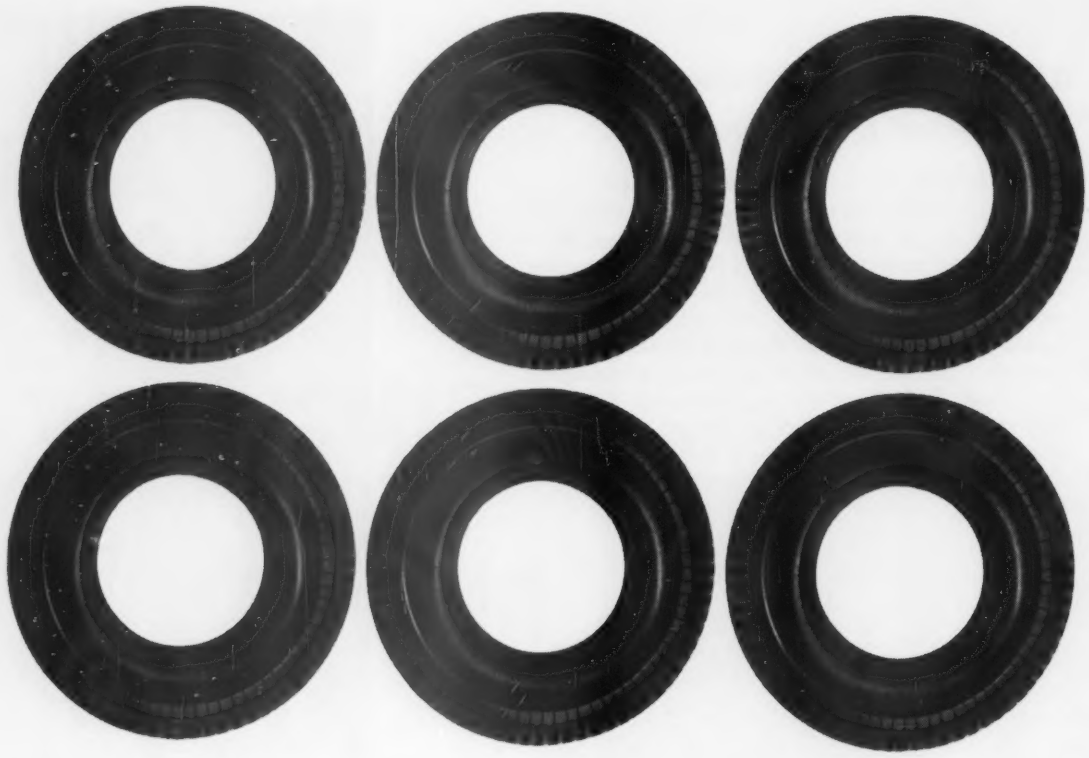

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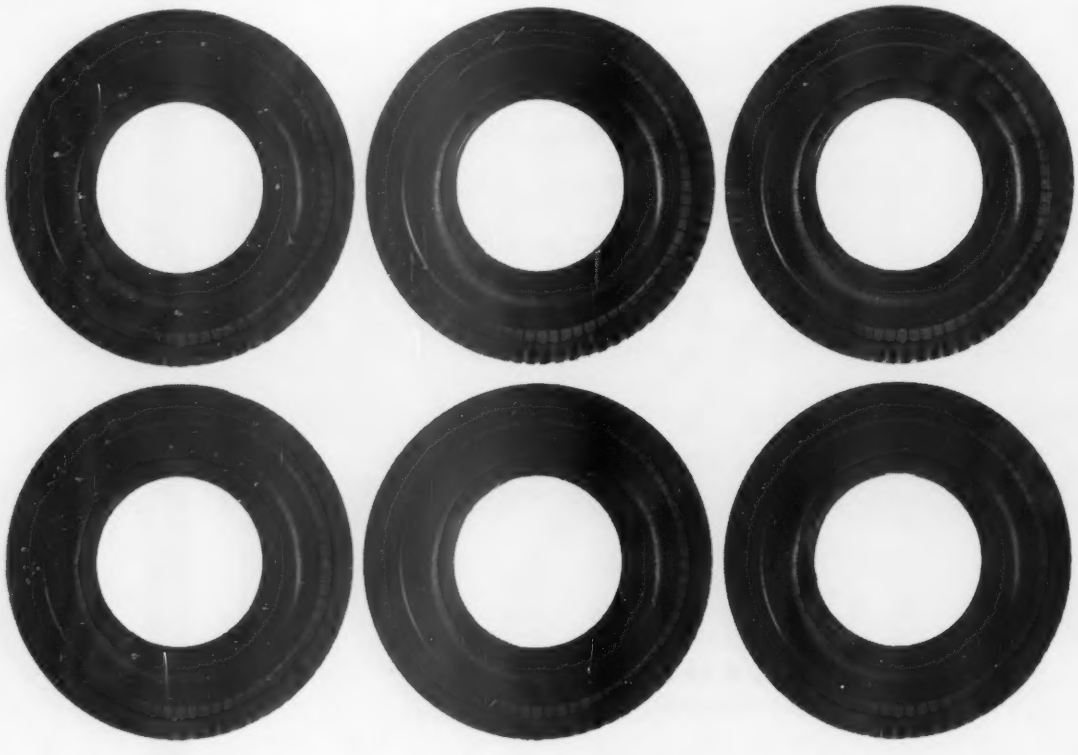

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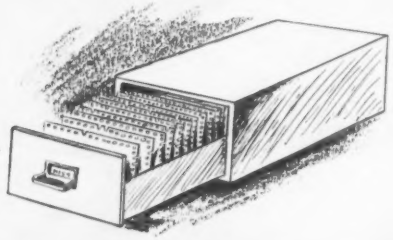

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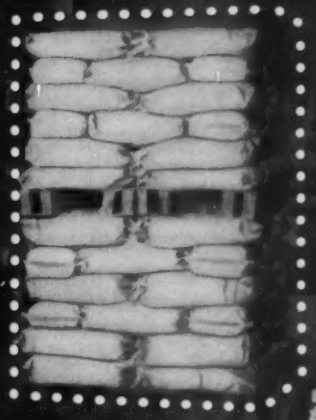

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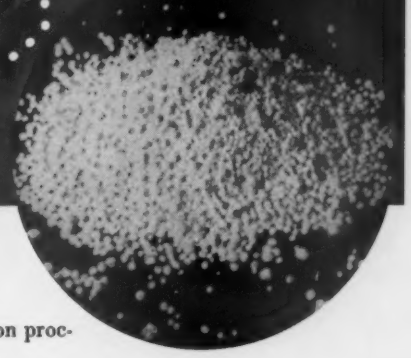

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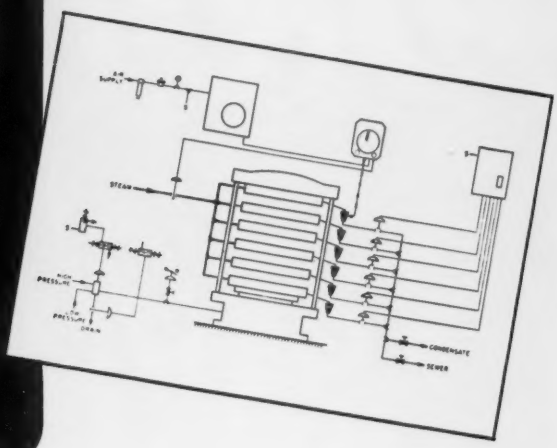

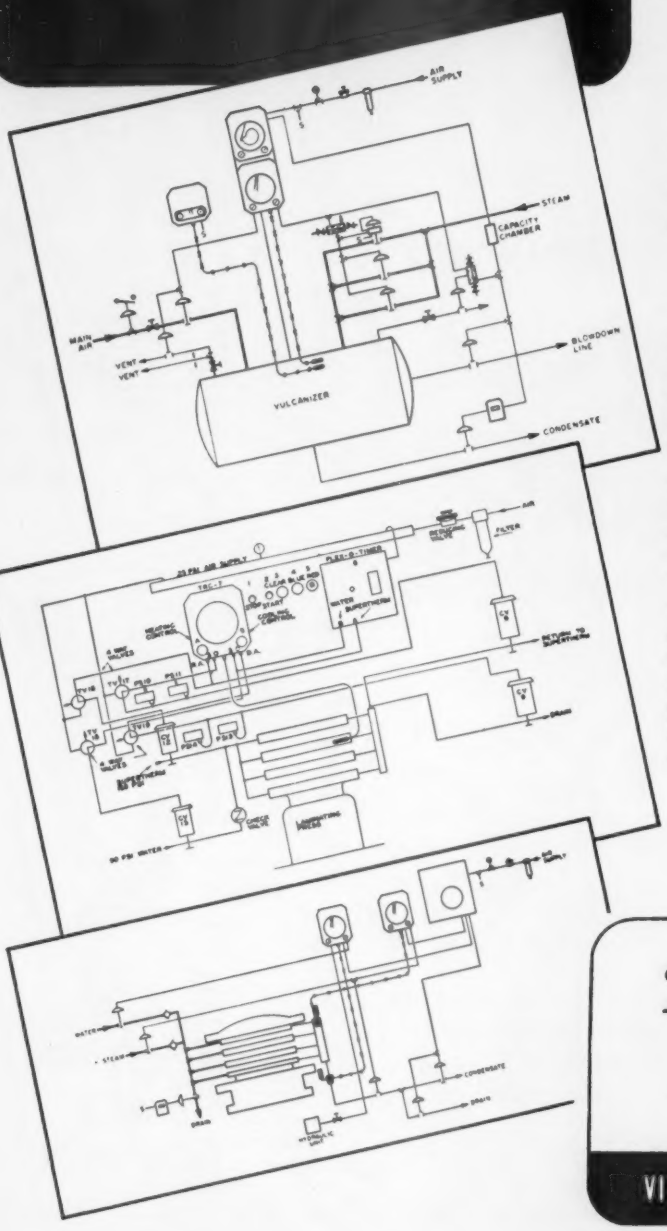

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ASRC 3106	Non-Staining
ASRC 3110	Non-Staining
COLD OIL	
ASRC 1703	Non-Staining
ASRC 1708	Non-Staining
ASRC 1712	Staining
ASRC 1713	Non-Staining
HOT	
ASRC 1004	Staining
ASRC 1006	Non-Staining
ASRC 1009	Non-Staining
ASRC 1018	Non-Staining
ASRC 1019	Non-Staining
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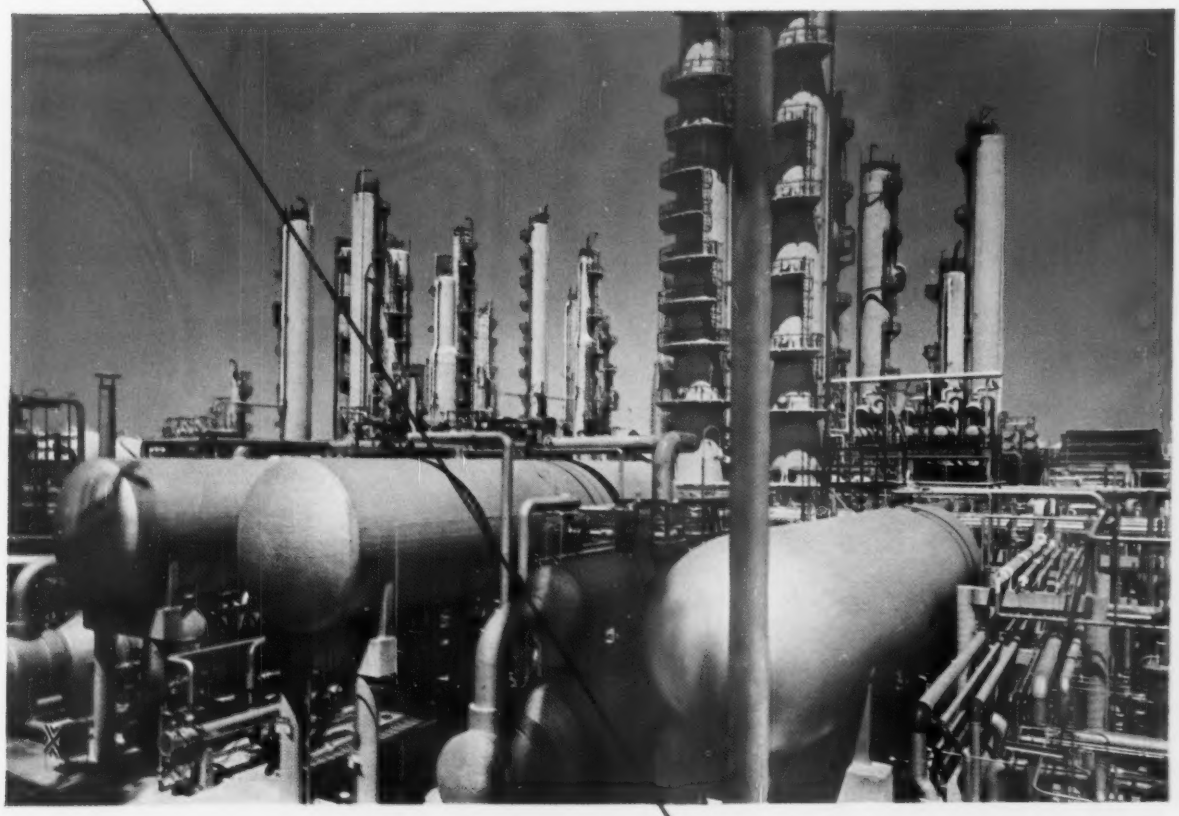

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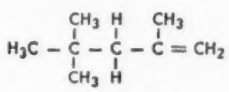
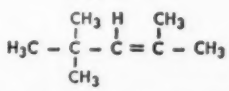


and 2,4,4-trimethylpentene-2



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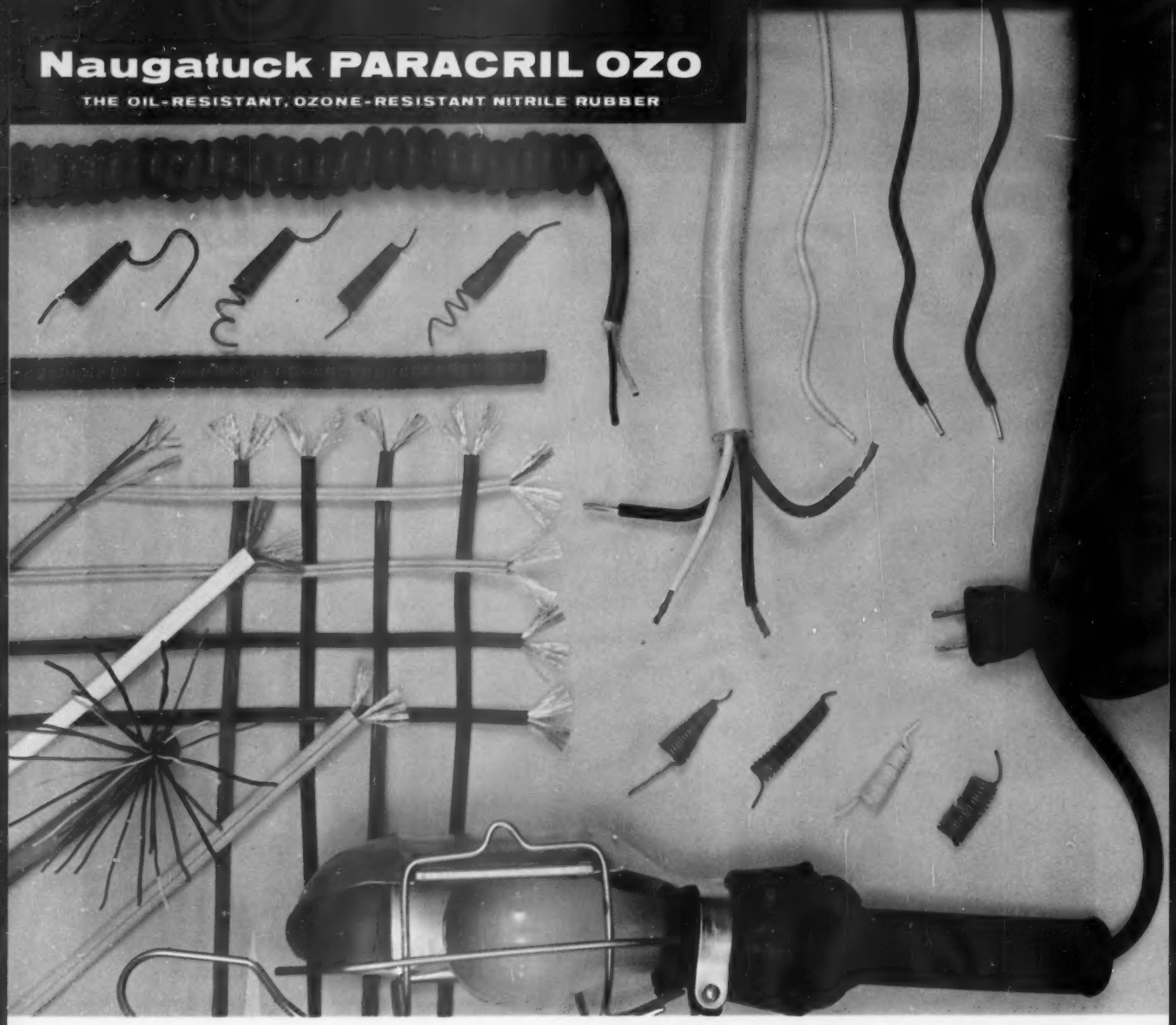

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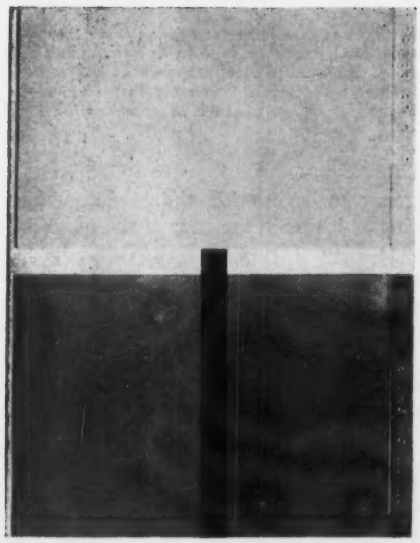

FIG. 1—Originally opaque natural rubber compounds can be made transparent with ammonium acetate. Addition of 5 phr zinc oxide makes sheets from Compound A (top) completely opaque, but does not affect transparency of B, identical except for 2 phr of NH_4Ac. Both were cured at 287°F.—A for 60 minutes, B for 15.

Some additional notes on...

Compounding Transparent Rubber

By RALPH F. WOLF* and C. C. STUEBER
Columbia-Southern Chemical Corp., Barberton, Ohio

SOME IMPROVEMENTS have been made in the transparency of vulcanized elastomers filled with reinforcing silica since the 1957 publication of the results of earlier work *(1)*. The transparency of the best natural rubber compounds reported previously has been still further enhanced by the use of additives which eliminate the opacity introduced by the zinc oxide needed for accelerator activation. Of much greater importance is the fact that very satisfactory transparency can now be obtained in silica-filled butyl rubber compounds.

It was stated in the work cited above that "transparent sheets can be made from properly compounded butyl rubber loaded with reinforcing silica. Butyl is not a particularly good material to use for transparent stocks, however, because even the best compounds are much less transparent than those that can be made with natural rubber, styrene-butadiene rubbers or nitrile copolymers." *(2)*

This is no longer true. In fact, silica-loaded butyl compounds have been developed with such good transparency that an important use may develop for them in the tire manufacturing industry. Using transparent butyl stocks, it is believed, will make it possible to spot incipient failure of curing bladders before they fail in actual service.

Improvements with Ammonium Salts

That zinc oxide is soluble in ammonia if an ammonium salt is present has long been known. The transparency of rubber compounds can be improved greatly by taking advantage of this fact.

It will be recalled from the earlier work that only small amounts of fine particle zinc oxides were used "in order that maximum activity could be obtained from a minimum amount of material." *(3)* It was stated that "this is necessary in working with transparent stocks because all zinc oxides have considerable covering power and no more should be used than is absolutely necessary."

This precaution is no longer necessary. Good transparency can be obtained even if the compound contains as much as 5 phr of zinc oxide, an amount frequently used for accelerator activation. At the lower zinc oxide levels, recommended originally for transparent compounds, even better transparency can be achieved than was obtained in the initial work by

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using small amounts of suitable ammonium salts in the compound. Ammonium acetate, for example, has proven particularly satisfactory. Its use not only results in improved transparency, but it also produces a much tighter state of cure as indicated by higher modulus, lower elongation and greater hardness. The improvement in physical properties appears to be of considerable potential importance in the compounding of silica-loaded compounds in general, not just those designed for transparency.

This effect of ammonium acetate is shown most dramatically when it is used in a compound not intended to be transparent. Compound A (Figure 1 and Table I) is completely opaque. From the standpoint of transparent rubber compounding, its zinc oxide content is too high, it contains too much sulfur, and the acceleration and activation are both wrong for transparency. Addition of two parts of ammonium acetate to this compound results in reasonably good transparency as shown by Compound B in Figure 1.

Specific Design for Transparency

The observation of this remarkable effect of ammonium salts in producing transparency in compounds not intended to be transparent, naturally led to a study of what it would do in compounds specifically designed for transparency.

A recipe was chosen for a control which had given excellent transparency in the earlier work. Two parts of ammonium acetate were added to an otherwise identical compound. A third compound was run in which the zinc oxide content was increased above that of the first compound. Two parts of ammonium acetate were added along with the higher zinc oxide in a fourth compound. The reasoning behind this was that, if ammonium acetate definitely improved transparency, it might be possible to increase zinc oxide content slightly and improve cured physical properties without sacrificing transparency to any great extent.

The recipes used and results obtained are shown in Table II, the effect on transparency in Figure 2. The addition of ammonium acetate (Compound D) very definitely improved the transparency of the control (Compounds C). Since the control already had

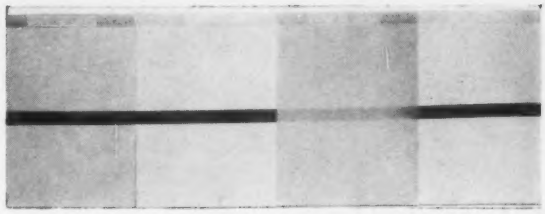

FIG. 2—Ammonium acetate also increases existing transparency in sheets from Compounds C through F (left to right). Adding zinc oxide to Compound C improved physical properties in the resulting E, but lowered transparency that is then more than restored by NH_4Ac in Compound F. All were cured 15 minutes at 287° F.

good transparency to begin with, the effect obtained is not as striking as it was in the case of the two compounds compared in Figure 1. In fact, opacity measurements made with the Hunter Reflectometer do not show the improvement and it is difficult to notice a difference when a tensile sheet made from the control (Compound C) and a sheet made from the compound containing ammonium acetate (Compound D) are laid side by side on top of a printed page. The improvement becomes noticeable only when looking through the sheets at a distant object. Then the sheet containing ammonium acetate is very much clearer and free of a slight haze which, in the control stock, impairs the outline of any object not in direct contact with the sheet. Stress-strain results indicate that the ammonium acetate may have taken too much zinc oxide out of action at the 1 phr zinc oxide level (Compound D).

Physical properties of Compound E containing a higher amount of zinc oxide (2.5 phr) were definitely improved. This improvement was obtained with no loss of transparency when ammonium acetate was present (Compound F). If ammonium acetate was not present in the compound containing 2.5 phr zinc oxide (Compound E), the stock was nearly opaque. These effects are clearly shown in Table II and Figure 2.

The desirability of holding elemental sulfur to a low level in transparent compounds was pointed out in the original work *(4)*. This was accomplished by

TABLE I—EFFECT OF AMMONIUM ACETATE ON AN OPAQUE, HI-SIL LOADED NATURAL RUBBER COMPOUND

Compound	Min. Cure at 287°F.	Modulus 300% E.	Tensile	Elongation	Duro A Hardness	Tear lb./in.	Transparency
A	7.5	210	1830	770	45	160	Opaque
	10.0	780	3280	660	56	660	Opaque
	15.0	880	3680	640	64	660	Opaque
	30.0	1160	3820	610	66	740	Opaque
	45.0	1200	3800	610	70	730	Opaque
B	7.5	1250	4100	630	65	790	Transparent
	10.0	1480	3960	580	69	750	Transparent
	15.0	1600	4000	580	72	680	Transparent
	30.0	1660	3560	520	75	640	Transparent
	45.0	1560	3530	530	75	630	Transparent

TABLE II—EFFECT OF AMMONIUM ACETATE ON A TRANSPARENT, HI-SIL LOADED NATURAL RUBBER COMPOUND

Compound	Min. Cure at 287°F.	Modulus 300% E.	Tensile	Elongation	Duro A Hardness	Tear lb./in.	Transparency
C	7.5	450	3400	710	55	250	Transparent
	10.0	690	4570	710	61	770	Transparent
	15.0	670	4560	710	61	770	Transparent
	30.0	580	4020	720	64	760	Transparent
D	7.5	200	2240	790	52	140	Transparent
	10.0	440	4160	750	61	660	Transparent
	15.0	430	4180	760	62	630	Transparent
	30.0	340	3480	760	65	690	Transparent
E	7.5	530	3690	710	56	600	Opaque
	10.0	760	4860	720	61	750	Opaque
	15.0	780	4730	720	61	740	Opaque
	30.0	690	4420	730	62	740	Opaque
F	7.5	630	4700	720	61	780	Transparent
	10.0	670	5020	750	64	810	Transparent
	15.0	630	4500	700	63	850	Transparent
	30.0	570	4440	730	65	800	Transparent

use of an organic sulfide such as Sulfasan R (dithiodimorpholine) in addition to elemental sulfur. This compounding trick is effective, but the organic sulfide, relatively expensive compared with elemental sulfur, increases total compound costs.

By use of ammonium acetate, it is now possible to compound good transparent natural rubber compounds with elemental sulfur at a normal 2.5 phr level, omitting the high priced organic sulfide. This is shown in Table III and Figure 3. Although the higher sulfur compound without the ammonium salt (Compound G) appears to have as good transparency as the one containing ammonium acetate (Compound H), this is not really the case. In addition to having much better tear resistance, Compound H is actually more transparent than G particularly when looking through the sheets at distant objects.

A comparison of Compound G in Table III with C in Table II indicates that it is not desirable to use higher sulfur in place of low sulfur plus Sulfasan R at low zinc oxide levels because it leads to sacrifice of physical properties. The use of ammonium acetate makes it possible to increase zinc oxide as well as sulfur without losing transparency. This is well demonstrated by Compound I which has even better physical properties than Compound C and excellent transparency. Obviously, a better balance of the necessary curing "accessories" is obtained by use of higher zinc oxide and higher sulfur than by combinations of higher sulfur-low zinc oxide or by low sulfur-low zinc oxide.

The ammonium acetate shown in Compound I costs approximately 80 cents a batch compared with $1.50 for the Sulfasan R used in Compound C. Since Compound I has better properties, equal transparency, equal scorch rate and lower cost than Compound C, we would now recommend this type of transparent natural rubber compound rather than one like Compound C which is similar to the original recommendations made in 1957.

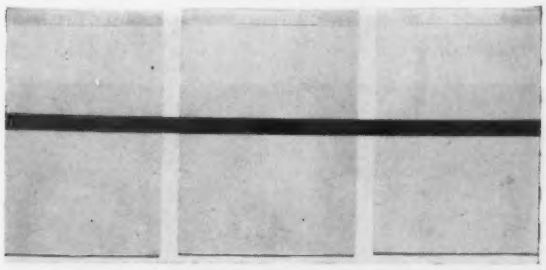

FIG. 3—Sheets from Compounds G, H and I (left to right) all have 2.5 phr sulfur loadings. The best of these natural rubbers in terms of transparency, physical properties and cost is Compound I with both NH_4Ac and high Zinc Oxide content. All sheets were cured 15 minutes at 287° F.

Styrene and Nitrile Butadiene

The use of ammonium salts did not prove effective as an additive to improve transparency of SBR and nitrile butadiene compounds. In the case of styrene rubber, the same compound previously recommended for good transparency *(5)* was chosen for a control. The addition of 1 or 2 phr ammonium acetate to this stock did improve transparency slightly, but also decreased modulus and tensile, and increased elongation.

This stock contained only 1 phr zinc oxide. It was thought that the apparent retardation of cure might have resulted from the ammonium salt taking too much zinc oxide out of action, not leaving enough to produce good vulcanization. Consequently, a compound containing 1 phr ammonium acetate, but with zinc oxide increased to 2.5 phr, was tested. Physical properties of this stock were as good as, but no better than, the control; and transparency was about equal. A further increase of zinc oxide to 5 phr did not im-

TABLE III—EFFECT OF AMMONIUM ACETATE ON TRANSPARENT NATURAL RUBBER COMPOUNDS WITH NORMAL SULFUR

Compound	Min. Cure at 287°F.	Modulus 300% E.	Tensile	Elongation	Duro A Hardness	Tear lb./in.
G	7.5	100	1320	810	42	90
	10.0	250	2440	730	45	170
	15.0	440	3250	700	53	260
	30.0	530	3440	680	58	220
	45.0	560	3420	700	60	220
H	7.5	440	3280	690	54	660
	10.0	460	3420	690	56	770
	15.0	500	3540	700	58	600
	30.0	460	3490	720	63	520
	45.0	410	3330	730	60	430
I	7.5	860	4810	670	57	850
	10.0	890	4650	640	57	830
	15.0	890	4750	660	61	810
	30.0	790	4460	670	60	790
	45.0	760	4270	660	60	700

prove physical properties and made the compound opaque.

A somewhat similar result was obtained in the case of a nitrile butadiene rubber stock vulcanized with a thiazole-accelerated thiuram curing system. Again, a compound previously recommended for good transparency *(5)* was chosen for a control. The addition of 3 phr ammonium acetate to this stock made the resulting compound darker and more scorchy, imparting lower modulus, tensile and tear resistance, although it did not affect hardness nor elongation.

Resin Cures of Butyl Rubber

Some time ago, one of the major rubber companies patented a curing system for butyl rubber based on the use of phenol dialcohols activated by halides or organic halogen compounds *(6, 7)*. Black-loaded butyl compounds vulcanized by this method were found to have exceptionally good heat resistance *(8)*. As a consequence, this type of compound has gained widespread acceptance for the curing bladders used in vulcanizing tires in the "Bag-O-Matic" press.

The effectiveness of this so-called "resin" cure for black-loaded butyl compounds led to an investigation of this type of curing system for silica-loaded stocks. Transparent compounds with good properties were obtained by means of resin cures when elastomeric halides such as Hycar 2202 (a brominated butyl) or Neoprene W were used as the activators. However, sheets of the vulcanized compounds were reddish brown in color and their use for transparent goods would be limited.

Substitution of Hi-Sil X303, an acidic silica, for Hi-Sil 233 improved the color from a reddish brown to a light amber. Better physical properties were also obtained when X303 was used. These improvements probably result from the fact that X303 has a pH of 4.5 compared with 7.0 for Hi-Sil 233, and acidic pigments are reputed to work better than alkaline or neutral materials in resin curing systems. Comparisons of the transparency and physical properties imparted by Hi-Sil 233 and X303 to resin cured stocks, activated by Hycar 2202 and by Neoprene W, are shown in Table IV and Figure 4.

Later a more quantitative effort was made to determine the optimum amounts of Hycar 2202 and Neoprene W which should be used as activators for resin cured butyl compounds loaded with silica. Each material was tested at 1, 2, 3, 5 and 10 part levels based on the butyl rubber. The effects on color, transparency and physical properties obtained by increasing the elastomer activator above one part were slight, hence it was decided to maintain it at the 2 part level in subsequent work.

Other Halide Activators

Other elastomeric halides which were tested as activators for silica-loaded, resin cured butyl included the experimental, chlorinated butyl rubber, Butyl MD 551, as well as Hypalon, a chlorosulfonated polyethylene. The chlorinated butyl gave about the same results as the brominated material (Hycar 2202) in transparency, color and physical properties. Hypalon gave physical properties equivalent to Neoprene W,

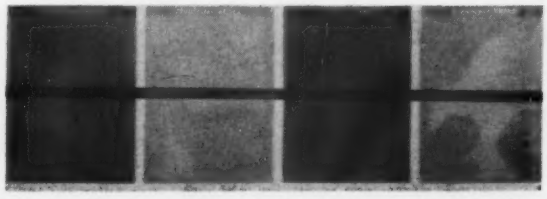

FIG. 4—Sheets from resin cured butyl Compounds J through M (left to right) reveal effect of elastomeric halides. J and K activated with Hycar 2202, as well as L and M with Neoprene W, show greater lightening with Hi-Sil X303 (in K and M) than 233 (in J and L). All were cured 60 minutes at 320° F.

was about equal in regard to transparency, but produced a somewhat darker color.

It has been reported *(8)* that zinc oxide has an activating effect on carbon black loaded butyl compounds in which the curing resin is catalyzed by halide-bearing elastomers. This was not found to be true in the case of silica-loaded butyl compounds. In these, zinc oxide decreased physical properties when either Neoprene W or Hycar 2202 was used as the elastomeric catalyst. This is shown by the results in Table V.

Good transparency was also obtained in silica-loaded, resin cured butyl compounds if a metallic halide such as stannous chloride was used for activation. This was true both with Hi-Sil 233 and X303. The Hi-Sil 233 loaded compound had an amber color; the X303 stock a more greenish cast which was less attractive. Properties of these two compounds are shown in Table VI. Again, use of zinc oxide proved undesirable. Although such results are not shown in Table VI for the sake of simplification, addition of 5 phr zinc oxide to either Compound R or S retarded

TABLE IV—COMPARISON OF ACIDIC AND NEUTRAL SILICAS IN ELASTOMERIC HALIDE ACTIVATED, RESIN CURED BUTYL COMPOUNDS

Compound	Min. Cure at 320°F.	Modulus 300% E.	Modulus 500% E.	Tensile	Elongation	Duro A Hardness	Tear lb./in.
J	30	180	290	1220	1110	64	150
	60	280	490	1670	920	65	180
	90	340	610	1740	840	65	180
K	30	170	330	1410	990	57	190
	60	230	430	1950	960	62	230
	90	280	540	2010	880	64	210
L	30	210	350	1280	1040	62	160
	60	330	620	1730	900	65	170
	90	380	690	1690	820	65	180
M	30	170	320	1390	1050	60	190
	60	220	440	2070	990	61	210
	90	280	560	2180	910	62	220

TABLE V—EFFECT OF ZINC OXIDE ON SILICA-LOADED, RESIN CURED BUTYL COMPOUNDS

Compound	Min. Cure at 320°F.	Modulus 300% E.	Modulus 500% E.	Tensile	Elongation	Duro A Hardness	Tear lb./in.
N	30	260	430	1220	1000	60	170
	60	410	690	1600	870	64	180
	90	450	810	1750	780	64	190
O	30	250	380	940	1000	60	140
	60	340	530	1300	850	65	160
	90	410	660	1480	790	65	160
P	30	200	330	1180	1060	62	160
	60	290	520	1520	900	64	170
	90	340	590	1680	850	63	170
Q	30	230	380	1120	1020	60	150
	60	320	510	1350	880	60	160
	90	360	590	1430	820	60	160

TABLE VI—COMPARISON OF ACIDIC AND NEUTRAL SILICAS IN METAL HALIDE ACTIVATED, RESIN CURED BUTYL COMPOUNDS

Compound	Min. Cure at 320°F.	Modulus 300% E.	Tensile	Elongation	Duro A Hardness	Tear lb./in.
R	10	750	1820	550	63	170
	20	940	1520	460	65	150
	30	980	1510	430	65	140
	45	1140	1440	370	69	130
	60	1210	1260	320	70	130
S	10	760	1990	560	69	260
	20	930	2030	500	70	230
	30	1030	2060	480	68	220
	45	1200	1820	420	68	210
	60	1330	1720	370	70	180

cure rate and decreased physical properties, particularly modulus and hardness.

Ferric chloride is not a satisfactory metal halide for use in producing transparent, resin-cured butyl compounds. All ferric chloride activated stocks were opaque, chocolate brown to black in color.

Adding More Stannous Chloride

A quantitative effort was made to determine the optimum amount of $SnCl_2$ to use as activator for the silica-loaded, resin cured compounds. Compounds containing amounts of $SnCl_2$ dispersion with 1, 2, 3 and 5 phr active material were compared. Unlike the elastomeric catalysts, definite differences were noticed as the amount of $SnCl_2$ was increased. Transparency did not change, but color of the stock went from a yellowish to a greenish cast with increasing $SnCl_2$. This was true with both Hi-Sil 233 and X303.

The greenish sheets are darker and, for this reason, it appears desirable to use the lowest amount of $SnCl_2$ consistent with good physical properties. From a consideration of results in Figure 5 as well as Tables VII and VIII, it appears that 2 or 3 phr $SnCl_2$ (2.67 or 4.0 phr of dispersion) is a desirable level. A lesser amount imparts slightly inferior physicals, while a greater amount makes the stock impossibly scorchy, degrades physicals to some extent and gives a darker color.

Resin cured sheets activated with stannous chloride are definitely faster curing than identical sheets activated with elastomeric halides. Therefore, it is suggested that in transparent butyl work the use of 1, 2 or 3 phr $SnCl_2$ is preferable to the elastomeric activators if the resulting color is acceptable.

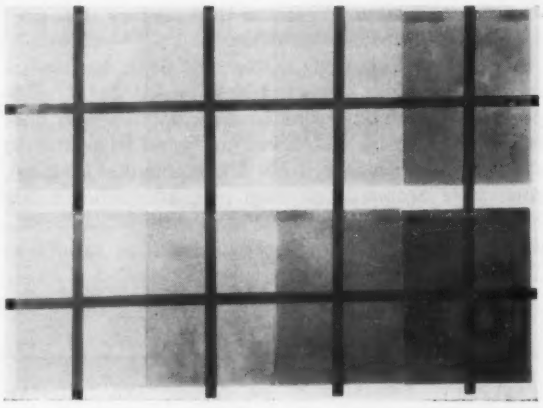

FIG. 5—Increasing amounts of metal halide activator cause progressive darkening of resin cured butyl compounds. Shown left to right are sheets from Compounds T, U, V and W (top) with 39 phr of Hi-Sil 233; X, Y, Z and Z' (bottom) with like amounts of Hi-Sil X303. $SnCl_2$ was increased from left to right in each series.

A comparison of Polysar Butyl 402 with Enjay Butyl 365 was made in connection with the work on metal halide activators. When tested in a compound similar to "V," the two polymers were found to give equal transparency, but the one based on Polysar had a slightly lighter color.

TABLE VII—EFFECT OF VARYING METAL HALIDE ACTIVATOR IN HI-SIL 233 LOADED, RESIN CURED BUTYL COMPOUND

Compound	Min. Cure at 320°F.	Modulus 300% E.	Modulus 500% E.	Tensile	Elongation	Duro A Hardness	Tear lb./in.
T	7.5	190	320	860	980	58	150
	10.0	250	400	1180	940	58	180
	15.0	280	500	1350	900	60	180
	20.0	330	590	1540	860	60	190
	30.0	420	750	1790	790	60	200
	45.0	500	920	1750	720	62	200
U	7.5	360	630	1670	820	58	190
	10.0	460	830	1800	750	60	190
	15.0	530	950	1770	690	60	200
	20.0	600	1120	1830	660	62	200
	30.0	690	1310	1790	600	63	170
	45.0	830	1540	1660	530	65	160
V	7.5	540	1000	1830	690	62	200
	10.0	630	1130	1900	670	63	180
	15.0	730	1400	1840	590	63	170
	20.0	820	1530	1810	550	65	160
	30.0	930	1720	1720	500	67	160
	45.0	1060	—	1500	410	67	150
W	7.5	670	1180	1670	610	60	170
	10.0	800	1440	1660	550	62	160
	15.0	890	—	1510	490	63	150
	20.0	1020	—	1410	420	66	140
	30.0	1110	—	1290	350	67	140
	45.0	1240	—	1240	300	68	120

Table VIII—Effect of Varying Metal Halide Activator in Hi-Sil X303 Loaded, Resin Cured Compound

Compound	Min. Cure at 320°F.	Modulus 300% E.	Modulus 500% E.	Tensile	Elongation	Shore A Hardness	Tear lb./in.
X	7.5	190	350	1930	1100	65	210
	10.0	240	490	2260	990	67	210
	15.0	320	630	2260	870	69	220
	20.0	350	700	2250	830	70	230
	30.0	430	850	2250	760	72	230
	45.0	500	970	2180	720	73	220
Y	7.5	380	790	2180	780	70	220
	10.0	450	950	2320	740	72	230
	15.0	570	1160	2350	690	74	200
	20.0	630	1280	2290	650	76	200
	30.0	770	1560	2150	590	77	160
	45.0	890	1810	1920	510	75	150
Z	7.5	500	1000	2310	710	69	210
	10.0	580	1170	2210	660	71	200
	15.0	700	1430	2210	610	73	180
	20.0	710	1530	2190	590	75	170
	30.0	890	1870	2000	510	77	150
	45.0	990	—	1810	450	77	140
Z'	7.5	650	1340	2180	620	70	180
	10.0	740	1540	2040	580	73	180
	15.0	860	1930	1980	510	74	160
	20.0	900	—	1920	480	75	160
	30.0	1020	—	1700	420	77	150
	45.0	1220	—	1520	340	78	130

Table IX—Formulas of Experimental Compounds

Natural Rubber Recipes

Compounds:	A	B	C	D	E	F	G	H	I
Pale crepe	100	100	100	100	100	100	100	100	100
Zinc oxide	5	5	1	1	2.5	2.5	1	1	2.5
Hi-Sil 233	58.5	58.5	39	39	39	39	39	39	39
Antiox. 2246	1	1	2	2	2	2	2	2	2
MBTS	0.8	0.8	1	1	1	1	1	1	1
Me. Zimate	—	—	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Hexamine	—	—	1	1	1	1	1	1	1
DOTG	1.2	1.2	—	—	—	—	—	—	—
Sulfur	3	3	1	1	1	1	2.5	2.5	2.5
Sulfasan R	—	—	1	1	1	1	—	—	—
Diethylene glycol	1	1	—	—	—	—	—	—	—
Ammonium acetate	—	2	—	2	—	2	—	2	2
Stearic acid	2	2	1	1	1	1	1	1	1
Mooney scorch *	19	7	19	21	18½	18	26½	11¼	20

Butyl Rubber Recipes

Compounds:	J	K	L	M	N	O	P	Q	R
Butyl 365	100	100	100	100	100	100	100	100	100
Hycar 2202	5	5	—	—	—	—	10	10	—
Neoprene W	—	—	3	3	10	10	—	—	—
Hi-Sil 233	39	—	39	—	39	39	39	39	39
Hi-Sil X303	—	39	—	39	—	—	—	—	—
Zinc oxide	—	—	—	—	—	5	—	5	—
Stannous chloride dispersion **	—	—	—	—	—	—	—	—	6.67
Amberol ST 137	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Stearic acid	1	1	1	1	1	1	1	1	1
Mooney scorch *	23	27	26	27	>30	>30	>30	>30	5¾

	S	T	U	V	W	X	Y	Z	Z'
Butyl 365	100	100	100	100	100	100	100	100	100
Hi-Sil 233	—	39	39	39	39	—	—	—	—
Hi-Sil X303	39	—	—	—	—	39	39	39	39
Stannous chloride dispersion **	6.67	1.33	2.67	4.0	6.67	1.33	2.67	4.0	6.67
Amberol ST 137	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Stearic acid	1	1	1	1	1	1	1	1	1
Mooney scorch *	4¾	23	15½	11	2½	28	15½	11½	6

* Minutes to a 5-point rise in minimum viscosity, using a small rotor at 250° F.
** Mixture of 75 parts stannous chloride in 25 parts Circo Oil, Ware Chemical Co., Westport, Conn.

Testing Different Combinations

The fact that such widely differing materials as an inorganic salt like stannous chloride and organic elastomers like chloroprene or halogenated butyls both activate the "resin" cure of butyl rubber raised the question of what would happen if the two types of activators were combined. Various combinations of $SnCl_2$ with Neoprene W and Hycar 2202 were tested but in no case were improvements obtained over straight $SnCl_2$ in respect to color, transparency or physical properties.

Compounding recipes of all compounds used in the entire test series are listed in Table IX.

A number of organic halides were also tested and proved less satisfactory than the halogenated elastomers or stannous chloride. Both trichlor and hexachlormelamine in combination with zinc oxide gave dark, translucent sheets. Transparency was improved but physical properties suffered when the zinc oxide was omitted.

Benzotrichloride in combination with zinc oxide gave transparent stocks, but these were dark brown and had poor physical properties. Omission of zinc oxide in this case decreased physicals still further and caused severe blooming. Chloranil gave opaque stocks with only fair properties. Use of Dihalo (brom-chlor-dimethyl hydantoin) resulted in very poor cures. Benzene hexachloride gave about equal transparency and similar color to those produced by the elastomeric activators, but the physical properties it imparted were slightly inferior.

LITERATURE REFERENCES

(1) Wolf, Ralph F., *Rubber Age*, Vol. 80, pp. 823, 1007 (1957).
(2) Wolf, Ralph F., *Rubber Age*, Vol. 80, p. 1015 (1957).
(3) Wolf, Ralph F., *Rubber Age*, Vol. 80, p. 828 (1957).
(4) Wolf, Ralph F., *Rubber Age*, Vol. 80, p. 825 (1957).
(5) Wolf, Ralph F., *Rubber Age*, Vol. 80, p. 824 (1957).
(6) U. S. Patents 2,701,895; 2,726,224; 2,734,877; 2,727,874; 2,734,039 and 2,749,323 assigned to United States Rubber Company.
(7) Tawney, P. O., Little, J. R., and Viohl, P., *Ind. & Eng. Chem.*, Vol. 51, p. 937 (1959).
(8) "Dimethylol Phenol Curing System in Butyl Rubber and Effect of Various Activators," Bulletin 100-4, Thiokol Chemical Corp. (1958).

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Radiation Resistance in Polysiloxane Elastomers—By David J. Fischer, Polymer Research Lab, Dow Corning Corp., Midland, Mich.

Experiments were conducted on a new series of polymers showing particular promise for use in radiation environment applications.

The Role of Carbon Black in the Thermal Oxidation of Polyolefins—By W. Lincoln Hawkins, Bell Telephone Laboratories, Murray Hill, N. J.

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PART 1 The Attrition Process And Its Effect On Carbon Blacks

By A. M. GESSLER
Chemicals Research Div., Esso Research & Engineering Co., Linden, N. J.

Introduction to This Three-Part Series

Because of its low unsaturation, the commercial acceptance of butyl has depended on the use of especially active or "ultra" accelerators such as the thiuram sulfides or the thiocarbamates. The much less active accelerators which are generally used with natural or styrene rubber lead to insufficient cure at practical curing times with butyl; even at best, to less than the optimum or most desired cure.

The need for separate and specific consideration of butyl vulcanization systems has long been recognized. But the need for a similar consideration of butyl reinforcement systems has generally been passed over much more lightly. Reinforcement and vulcanization are almost equally important requisites to obtaining the best properties in a tire tread. With this thought in mind, it is the purpose of the present papers to show that, for these optimum properties, butyl requires not only "ultra" accelerators, but "ultra" reinforcing pigments as well.

In the reported research, especially active or "ultra" carbon blacks are prepared from standard blacks by severe attrition. The chemical and physical changes wrought in the carbons by this attrition are studied in the first paper; the profound effects of attrited carbon blacks in butyl are discussed in the second. These effects, it is proposed, overcome cure rate and hysteresis difficulties normally associated with vulcanization limitations. The advantages which result from the use of attrited blacks in natural, styrene and acrylonitrile rubber are considered in the last paper. While there is a lesser need for activated blacks in polymers with relatively much higher unsaturation than butyl, it is interesting to note the general improvements obtained when attrited blacks are used in such polymers.

The extent of the physical and chemical changes which attend the attrition of carbon blacks is surprising. Though the present papers restrict themselves to the consideration of carbon blacks, the results suggest a breakthrough in a much broader area. The activation of solids generally is envisioned, and it is suggested that this activation should be sufficient to present a means or process for solid phase reactions which would be carried out either during or immediately following the severe attrition.

IT IS generally recognized that the reinforcing action of carbon black is associated with four main properties of the black: First, the geometry of the individual particle, its size and shape; second, the cumulative surface area which, due to the widely varying extent of surface porosity, is not uniquely related to the average particle size; third, the chemical nature of the particle surface, and, finally, the extent and persistence of aggregation habits—in effect, the secondary or aggregated particle structure. These properties, normally fixed by the conditions of hydrocarbon combustion, are profoundly affected by severe attrition of the black. This is a surprising result which leads to the formation of a completely new group of rubber-grade carbon blacks with greatly improved reinforcement characteristics.

It is the purpose of this paper to describe the experimental techniques employed for severe attrition of the blacks and to show how their properties are changed by this process. Subsequent papers will consider the effects of attrited blacks on butyl and on other elastomers, respectively.

Attrition by Ball Milling

In the laboratory, the severe attrition of carbon black is most conveniently accomplished by ball milling. When controlling the speed of the ball mill and the charge of black and grinding medium, ball milling is no longer a haphazard stirring or throwing action *(1)*. Rather, it forms a cascading, sliding stream that contains several layers of balls separated by carbon black. The top layers in the stream travel at a faster speed than the lower layers, causing a grinding action between them. There is some additional grinding action through gyration of individual balls and secondary movements inside the main contact lines.

The severe attrition of carbon black requires that conditions be established to permit a maximum amount of work on the black. For this reason, steel balls rather than flint stones are used as the attrition

A completely new class of rubber reinforcers has been produced by structural transformation of blacks through ball milling. The first article of this series discusses experimental milling methods.

medium. For best results, approximately a third of the mill volume is filled with the attrition medium, another third with black. Pains should be taken to assure that the black is maintained as a free flowing powder during the full course of the attrition run. Baffles or other sharp edges on the inside of the mill are, therefore, undesirable. Drying the black to remove absorbed water is helpful in preventing its caking on the walls of the mill.

Experiments have been conducted with generally similar results in our laboratories using 1¼ gallon assay jars of steel or porcelain, turning at 66 rpm, and commercial 17 and 70 gallon, steel ball mills. The effects of both time and temperature on ball milling have been investigated, and will be discussed later. Unless otherwise stated, results will be reported for 350 grams of black, ball milled at room temperature and atmospheric conditions, using a 1¼ gallon steel assay jar with 22 pounds of ⅝-inch diameter, polished steel balls. Variations in the diameter of the steel balls between ¼ and 1 inch produce little or no change in the attrition effect, provided the volume of balls is maintained constant.

Experimental Effects on Blacks

A variety of carbon blacks representing the full range of industrial rubber-grade blacks were attrited. For the most part, attrition was accomplished by the ball milling method described. Some interesting results, however, were also obtained from two-roll (rubber) mill attrition of carbon blacks. These will be reported in a later section of this paper.

Standard and attrited carbons have been tested for surface area, oxygen content, pH, and oil absorption. Surface area was determined for each black from its low temperature nitrogen adsorption isotherm, according to the procedure of Brunauer, Emmet, and Teller *(2)*. The oxygen content of the black was measured by the direct Untersaucher method, modified. In this test, oxygen is liberated from the black by pyrolysis at 650° C. in nitrogen. The vapors are passed over carbon at 1120° C. to convert them first to carbon monoxide, then to carbon dioxide. The concentration of the latter is determined volumetrically. To avoid difficulties from the variable amounts of water which may be absorbed by the attrited blacks, samples of the blacks were heated for two hours at 135°C. prior to testing for oxygen content.

Slurry pH and stiff paste oil absorption were measured for each black, using the methods described by Sweitzer and Goodrich *(3)*. Stiff paste oil absorptions are used to assay secondary or aggregated carbon black structure. A "Structure Index", derived from simultaneous consideration of oil absorption and surface area, rates subnormal structure carbons with values below 100, and super-normal structure carbons with values above 100 *(3)*.

TABLE I—EFFECT OF BALL MILLING (24 HOURS) ON THE PROPERTIES OF FURNACE BLACKS

Black	Condition	Surface Area (M^2/g)	Weight % Oxygen	Slurry pH	Structure Index
SRF (Furnex)	Standard	26	0.09	9.2	100.0
	Ball Milled	104	1.34	5.9	83.8
FEF (Philblack)A	Standard	46	0.43	8.3	173.0
	Ball Milled	117	1.53	4.5	70.0
HAF (Philblack O)	Standard	80	0.58	6.9	138.0
	Ball Milled	136	1.72	3.5	73.0
SAF (Vulcan 9)	Standard	142	0.93	6.4	108.0
	Ball Milled	179	1.69	3.5	44.7

Changes in Basic Properties

Typical data showing the magnitude of the changes in the properties of carbon blacks after ball milling are shown in Table I. Each of four different blacks in this series was first dried by heating 24 hours at 135° C., then ball milled under standard conditions for 24 hours.

Surface area is greatly increased by ball milling, the relative increases being proportional to the original particle size of the black. For SRF black, with an original particle diameter of ~90 mμ (arithmetic mean), surface area is increased 4.0 times, whereas for SAF, with an original particle diameter of 10-15 mμ, it is increased only 1.3 times. For intermediate blacks, with original particle diameters of ~35 and 20mμ, the increases are 2.5 and 1.7 times, respectively.

The oxidation of carbon black by ball milling is one of the most interesting aspects of severe attrition. This oxidation and the concomitant changes in pH are presented as independent evidence that chemical as well as physical changes are produced by attrition.

The ball milling of carbon black was initiated in our laboratories for the express purpose of breaking structure in the black. "Structure Index" data in Table I attest to the success with which this goal was achieved.

Surface Area Increases

Only a small portion of the increases in surface area, which are produced by severe attrition of carbon black, are caused by breakage of aggregate structure. This result, first evident from the very large increases in surface area attending ball milling of subnormal structure thermal blacks, was studied in some detail. Acetylene (Shawinigan) black, a black with unusually high secondary or aggregated structure *(3)*, was ball milled for varying periods of time. Surface area and oil absorption measurements were made after each ball milling run.

The stiff paste oil absorption of acetylene black is decreased sharply in the first 4 to 8 hours of ball milling (Figure 1). The "Structure Index", originally 382 (oil absorption—34 gallons/100 lb.) is reduced to its minimum value of 40 (oil absorption—8 gallons/100 lb.) during this time. The surface area, on the other hand, though increasing more than three-fold in 24 hours of ball milling, undergoes less than 14 per cent of its total change in this period. The very

large increases in surface area after 8 hours of ball milling, therefore, must be attributed to something over and beyond new surfaces produced by breaking aggregate structure alone.

An explanation for the extraordinary surface area increases attending the severe attrition of carbon blacks was found in electron microscope work at the Godfrey L. Cabot Laboratories, Boston, Mass. This showed that the particles of ball milled blacks are peripherally chipped or abraded as a result of the attrition. The effect, which is particularly evident in the case of larger particle size thermal blacks, is shown for MT black in Figure 2. Photomicrographs of the original black show particles with sharp, well defined edges, of a very nearly circular or spherical shape.

Photomicrographs of the same black after 96 hours of ball milling show that the particles have become permanently distorted or misshapen. The original, generally spherical shape is replaced by a much more irregular shape which, in many instances, resembles that of a thoroughly soaked kidney bean. The edges of the particles, in addition, appear not nearly so sharply defined as originally. Portions of individual particles have apparently been chipped or broken away by attrition, and the resulting abraded debris is apparent in the large number of relatively small, randomly shaped fragments that remain clustered in the vicinity of the parent particles. Surface area increases, as a result of these pictures, must be attributed not only to new surface provided by this host of loose abraded fragments, but also to new surface from the greatly increased porosity associated with the gouged or torn edges of the parent carbon particles.

Eliminating Aggregation Habits

"Structure Index" values in Table I were obtained by plotting the stiff paste oil absorption values for the blacks against their surface areas. A plot of this type is shown in Figure 3, with the band of normal absorption reproduced from the work of Sweitzer and Goodrich *(3)*. Points in this band show carbons with

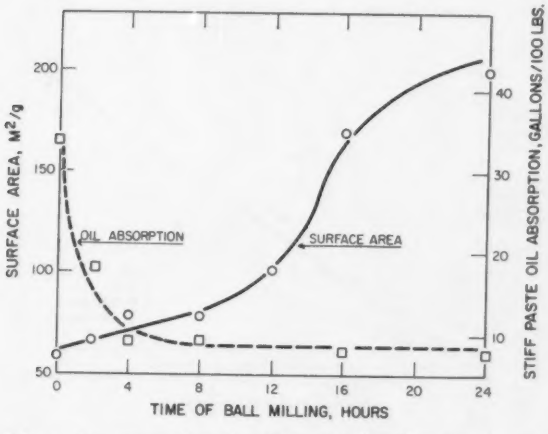

FIG. 1—Two curves show the effect of ball milling time on the surface area and stiff paste oil absorption of acetylene black.

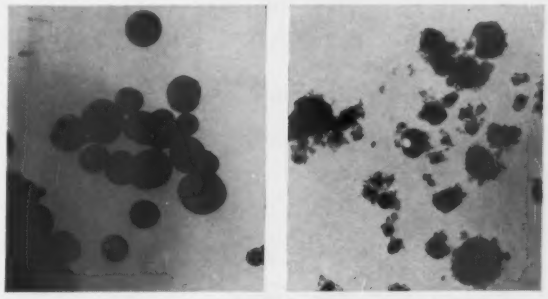

FIG. 2—Photomicrographs of MT black reveal the circular shape of original particles on the left, and their irregular form after 96 hours of ball milling.

normal structure: SRF and MPC. Carbons with high structure, i.e., those whose original reticulate structure is not broken even after extended milling in rubber *(4)*, are represented by points lying above this normal absorption band, in the region of super-normal absorption: acetylene black, FEF and HAF. Carbons with low structure, i.e., with an original reticulate structure that breaks much more easily when the black is milled with rubber, fall below this normal absorption band, in the region of subnormal absorption: FT, as well as previously mentioned blacks after ball milling. The "Structure Index" is obtained by the expression A/B $\times$ 100, where "A" is the absorption value for the carbon black and "B" is the theoretical, stiff paste oil absorption value taken at the center of the normal absorption band for an equivalent surface area.

The data in Figure 3 emphasize the effect of attrition on the original reticulate structure of carbon blacks. Ball milling breaks up carbon structure. As a result of attrition, carbon particles tend to exist as individuals, rather than as collections of individuals in clustered or aggregated masses as did the original carbons. An important aspect of the shape factor of the original carbons is thereby eliminated and more uniform, close packing of carbon particles is obtained, as is evident from the stiff paste, oil absorption tests.

Following attrition, oil absorption becomes independent of surface area of the black, and dependent, presumably, only on the volume of black. This is an important point to which further reference will be made later, in the discussion of butyl rubber. From a theoretical point of view, however, it is pertinent to note here that it is possible to prepare a group of blacks by attrition with essentially no aggregation habits; then, to use these blacks to study the effect of surface area on reinforcement without the complicating influence of shape factor considerations that prevail in the case of the original, structured carbons.

Achieving Higher Oxygen Content

The oxidation of carbon black on attrition is the direct result of enhanced chemical activity which must be associated with the creation of new surfaces. Thus, in a series of attrited blacks, the increase in

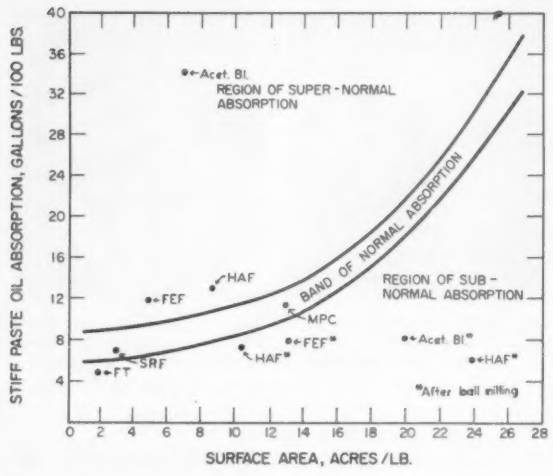

FIG. 3—The effect of ball milling on stiff paste oil absorption and surface area characteristics of several carbon blacks is indicated, asterisks denoting blacks after ball milling.

oxygen content is directly proportional to the increase in surface area. An average ball mill run causes an increase of about 0.16 per cent by weight in oxygen content for every 10 M^2/gram increase in surface area. Plots of surface area versus oxygen content for several attrited blacks are shown in Figures 4 and 5. In Figure 4, the coarser blacks—FT, SRF, and FEF—are considered, while Figure 5 includes the finer blacks—HAF, ISAF, and SAF. Data for these figures were obtained by ball milling each of the carbons for varying periods of time, then submitting samples from the resulting runs for surface area and oxygen analyses.

The oxidation of carbon black has been shown to lead to porosity which is said to arise from preferential attack of oxygen at high energy sites on the carbon surface *(5)*. Carbon black particles, it has been pointed out *(6 and 7)*, appear to burn preferentially, opening up pores and crevices, and providing internal surface area available for the adsorption of nitrogen. With this in mind, it was at first considered possible that surface area increases in attrited black were the result of oxidation. High frictional heats, produced momentarily at the carbon surface when the carbon particle or cluster of particles was impacted between two colliding steel balls, were thought to cause the oxidation.

Later work proved that this was not the case. The surface area of FEF black, for example, was increased from 48 to 126 M^2/g when the black was ball milled in nitrogen. Milling brought no significant change in the oxygen content of the black. Subsequent exposure of this ball milled black to air, however, was accompanied by an oxidation, the oxygen content rising from a few tenths to 1.23 weight per cent. No attempt was made to measure the rate of oxidation, since it was desired only to establish cause and effect in oxygen and surface area changes.

Extended Ball Milling

Blacks which are ball milled for long periods of time are not completely oxidized in the course of the run. The utilization of oxygen from the atmosphere in the ball mill is evidenced in these runs by the existence of a partial vacuum at the end of milling. If the ball mill is opened immediately—while the black is still warm from the frictional heat of milling—the black may burn spontaneously in an exothermal reaction. The attrited black surfaces in direct contact with air turn glowing red, like briquettes in a charcoal fire, and the burning continues until the black is completely oxidized.

The ignition temperature of carbon black is lowered by ball milling. After severe attrition in a standard ball mill operation, burning can be initiated simply by heating the black in a container on a hot plate for a few minutes at 800° to 1000°F. Removed from the hot plate, the black continues to burn until it is burned out. Standard or conventional blacks are not burned even if they are heated for several hours on the same hot plate.

In recent work *(8, 9 and 10)*, convincing evidence has been presented for the "mechanico-chemical" mechanism of polymer degradation. The essence of this work holds that mechanical forces, such as those involved in the milling of rubber, are capable of breaking polymer chains whose ruptured ends are free radicals formed by the homolytic scission of C-C bonds. It has also been proposed *(9)* that reinforcement is the result of polymer-carbon attachments, the carbon black providing sites for the attack of free radicals produced by "mechanico-chemical" degradation of rubber. The gel formation in mixtures of carbon black and rubber, it has been pointed out, is greater on mastication in nitrogen than in air. No gel is formed when rubber and black are combined without shear (mastication) in benzene. Thus, reinforcement is said to result from a network of rubber and carbon black being held together by chemical bonds formed through the combined free radical activity of rubber and black.

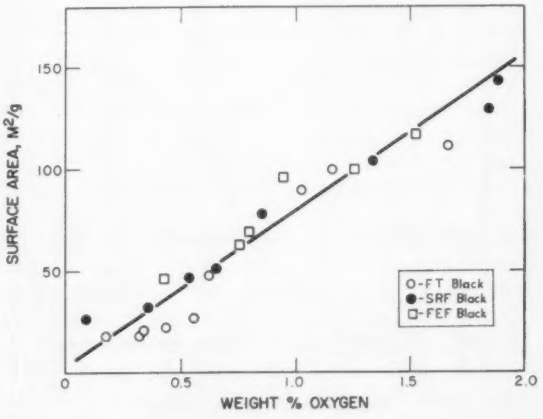

FIG. 4—Surface area vs. oxygen content is plotted for three coarse blacks, ball milled for varying periods of time.

Interaction of Free Radicals

Speculating from the cited experimental work, it is suggested that the oxidation of carbon black following ball milling is the result of free radical interaction. Unpaired electrons may be made available to oxygen by the mechanical cleavage of C-C bonds at the surface of the carbon particle. The presence in attrited blacks of increased concentrations of unpaired electrons seems to fit the increased reinforcement resulting from the use of these blacks. For example, thermal blacks, which are reported to have lower unpaired electron concentrations than furnace blacks *(11)*, respond more sharply to ball milling.

The very large improvements in reinforcing properties of attrited thermal blacks may, in part at least, be caused by the increased number of unpaired electrons on the black surface. Unpaired electrons may be made available either as a result of C-C bond fracture, as already mentioned, or through the exposure or uncovering of unpaired electrons originally present only in the interior of the black particle.

The close packing of particles in attrited blacks, it is believed, shields some free radicals on the surface of the particles from oxygen attack when the black is at rest. These radicals, however, are made available to rubber when the particles are disrupted by milling. Evidence for this is found in the fact that the further oxidation of attrited black appears to be a diffusion rate controlled reaction. While the oxygen content of nitrogen ball milled FEF black rises from a few tenths to 1.23 per cent by weight when the black is exposed to air for five days, it rises to 1.77 per cent by weight when the same black is exposed to 100 lb. oxygen in a bomb for five days. Standard FEF black shows no change in oxygen content when submitted to either of these exposure tests.

X-Ray Study of Crystallites

X-ray studies indicate that a particle of carbon black is made up of many small pseudographitic crystallites located randomly within the particle *(12 and 13)*. In each crystallite there are two to five parallel sheets of hexagonally packed carbon atoms which are also in random orientation. The dimensions of these crystallites or parallel layer groups are found by X-ray diffraction measurements, L_a and L_c referring, respectively, to the crystallite dimensions parallel and normal to the layers. In almost all carbon blacks, regardless of process or feed stock, these crystallite dimensions are very nearly the same, with $L_a \simeq 12$Å and $L_a \simeq 20$Å.

The graphitization or heat treatment of carbon black above 1000° C. leads to growth of the crystallites, L_c and L_a sometimes increasing as much as tenfold or more *(12 and 14)*. Since the effects of graphitization are to make the black generally less active (i.e., to reduce its reinforcing action in rubber) and the effects of attrition are to make the black more active (i.e., to increase its reinforcing action), it seemed natural to inquire whether the changes produced by attrition might not be related to the partial destruction of crystallites in the carbon particle. X-ray diffraction measurements were therefore made using a Geiger counter X-ray spectrometer (North American Philips) with a copper target diffraction tube. FT and SAF blacks were examined before and after ball milling. No crystallographic changes were noted in the blacks, L_c and L_a values for all four samples being in the range already given for carbon blacks generally. The identical values which were obtained from the same black before and after ball milling are surprising in the light of other changes listed below:

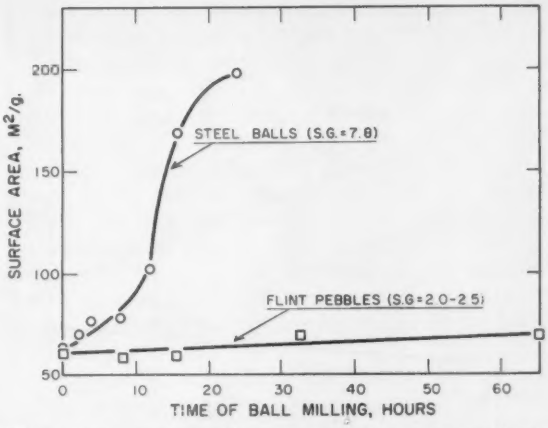

FIG. 6—Two curves of surface area changes in acetylene black compare effects of two milling techniques: steel balls and flint pebbles.

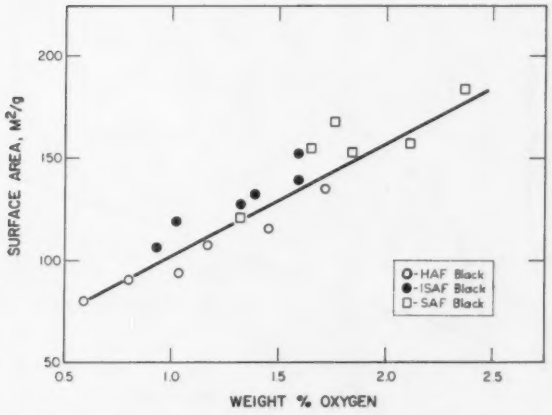

FIG. 5—This graph shows surface area vs. oxygen content for three fine blacks, ball milled for varying periods of time.

		Surface Area, $M^2/g.$	O_2 Content, Wt. %
FT Black *	Standard	16	0.25
	Ball Milled	128	1.97
SAF Black **	Standard	136	1.43
	Ball Milled	172	2.59

* Ball milled 30 hours, 17 gallon mill.
** Ball milled 20 hours, 17 gallon mill.

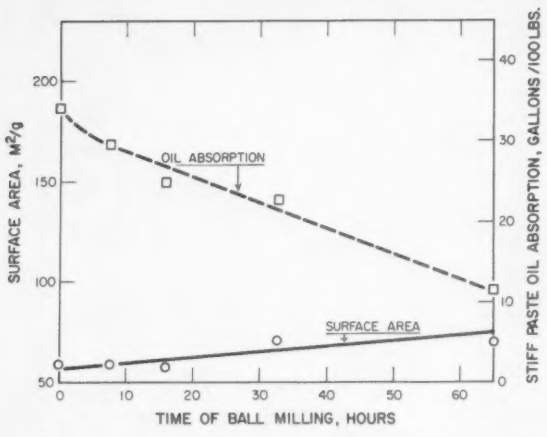

FIG. 7—The gradual effect of ball milling with flint pebbles is shown by data on milling time vs. absorption of acetylene black.

Steel Balls or Flint Pebbles

As already stated, the severe attrition of carbon black in a ball mill requires the use of steel balls. Similar results are not obtained even after extended ball milling with flint pebbles or stones. This is illustrated in Figure 6 for a series of runs with acetylene (Shawinigan) black. Only minor increases in surface area are obtained with flint pebbles. After 66 hours, for example, the product is roughly equivalent to that obtained after only 4 hours with steel balls.

This interesting result points out very clearly that the efficiency of ball milling is related directly to the severity of attrition forces. Increasing the mass of the attrition medium increases the kinetic energy which is developed by the medium when the mill is set in motion. Hence, more work per unit time is done and the efficiency of the operation is greatly enhanced. The use of higher density balls, say tungsten-steel alloys, is suggested as a means of further reducing the time required for the severe attrition of carbon black in ball mill operation.

The principal change accompanying the ball milling of acetylene (Shawinigan) black with flint pebbles is the breakage of carbon structure. Figure 7 shows that stiff paste oil absorption of the black decreases slowly and uniformly on attrition with flint pebbles, unlike the effect of steel balls shown in Figure 1. Even after 66 hours, it has not reached the minimum value obtained in only 4 to 8 hours with steel balls. Thus, a steady and continuing decrease in structure is indicated. The corresponding surface area changes, already shown in Figure 6, are given again here to emphasize that relatively small increases in surface area result from the breakage of carbon structure alone.

Closer Packing of Particles

The breakage of carbon structure permits the random, close packing of carbon particles. This result, which is evident from oil absorption tests, is confirmed by the fact that the bulk density of acetylene black is increased from 5.1 to 17.7 lb./cu.ft. after 66 hours of milling with flint stones. Measurements of bulk density were made by weighing 200 grams of black in a graduated cylinder, and taking the final volume as that obtained after the black had been allowed to settle for one week with occasional light tapping.

Dobbin and Rossman ball milled acetylene (Shawinigan), HAF and SRF blacks with flint pebbles *(15)*. Severe attrition was not obtained. Oil absorption was reduced in the blacks with relatively small increases in surface area, the results being similar to those reported in Figure 7. Dobbin and Rossman attributed the increased bulk density which they found in ball milled blacks to the closer particle packing that resulted from the destruction of structure in secondary aggregates.

The prospect of increasing the work done in the ball mill by increasing the rotation speed of the assay jar was investigated. Using standard loading conditions, jars were run for predetermined times at 66, 76, 86, and 96 rpm. Little or no difference was found in the properties of the resulting blacks.

The efficiency of the attrition process was not significantly changed when the temperature of ball milling was increased from room temperature to 300° and 400° F. HAF black was ball milled for varying times in a jacketed, 17-gallon steel mill. Circulating oil was used in the mill jacket to obtain and maintain the desired operating temperatures.

Varying Mill Speeds and Sizes

The severity of attrition is increased with the size, specifically the diameter, of the ball mill. Figure 8 shows the surface area changes obtained with FT

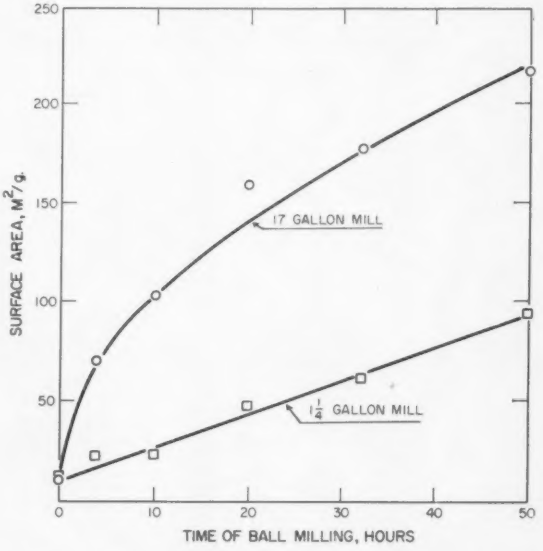

FIG. 8—Two curves compare the efficacy of 1¼ with 17 gallon mills on ball milling time vs. surface area of FT black.

TABLE II—SUMMARY OF BALL MILLING EFFECTS WITH DETAILED TIME BREAKDOWN

Black	Ball Milled, Hours	Surface Area, M^2/g	% Oxygen	pH
MT (Thermax)	0	11.0	<0.01	6.8 - 7.0
	4	20.0 - 64.0	0.07 - 0.57	5.2 - 4.1
	10	20.0 - 72.0	0.35 - 0.75	5.2 - 4.0
	20	88.0 - 121	0.82 - 1.35	4.3 - 3.9
	35	118 - 138	1.71 - 1.85	4.3 - 3.6
	50	128 - 144	1.87 - 2.40	4.6 - 3.7
FT (Sterling FT)	0	18.0	0.18	7.6
	8	21.0	0.34	6.5
	16	27.0	0.56	6.4
	24	48.0	0.62	6.3
	30	90.0	1.02	5.8
	40	100.0	1.16	5.4
	50	112.0	1.67	5.3
FT (P-33)	0	14.0 - 11.0	0.10 - 0.14	7.4 - 7.6
	4	22.0 - 70.0	0.17 - 0.38	6.2 - 5.6
	10	23.0 - 103	— - 1.01	5.6 - 4.8
	20	48.0 - 158	0.53 - 1.24	5.2 - 4.8
	35	61.0 - 176	0.82 - 1.93	4.9 - 3.7
	50	95.0 - 214	1.17 - 2.14	5.2 - 3.7
SRF (Furnex)	0	26.0	0.09	9.2
	4	32.0	0.36	7.7
	8	46.0	0.54	6.9
	16	78.0	0.86	6.4
	24	104.0	1.34	5.9
	30	—	1.47	5.3
	40	130.0	1.84	5.3
	50	140.0	1.89	—
FEF (Philblack A)	0	46.0	0.43	6.2
	4	63.0	0.76	4.7
	8	69.0	0.80	4.5
	12	95.0	0.96	4.2
	16	101.0	1.26	4.0
	24	117.0	1.53	4.5
HAF (Philblack O)	0	80.0	0.58	6.9
	4	90.0	0.81	5.1
	8	95.0	1.04	4.3
	12	108.0	1.18	4.1
	16	116.0	1.45	4.1
	24	136.0	1.72	3.5
ISAF (Statex 125)	0	107	0.93	6.8
	4	119	1.03	3.7
	8	124	1.33	3.6
	12	134	1.38	3.4
	16	139	1.59	3.3
	24	152	1.59	3.3
SAF (Vulcan 9)	0	133	1.21	6.4
	5	145	1.40	3.7
	10	156	1.63	3.6
	15	169	1.75	3.5
	25	168	1.84	3.3
	35	178	2.09	3.3
	50	185	2.27	3.0
MPC (Kosmobile S66)	0	118	1.66	—
	4	120	1.37	—
	8	135	1.59	—
	12	135	2.19	—
	16	178	2.86	—
	24	215	2.89	—

black after ball milling for varying times in a 1¼ gallon assay jar and a 17 gallon mill.

The operating speed of a ball mill is selected so that the balls will rise up the leading side of the mill to a point at about a 45-degree angle to the horizontal mill diameter, and then fall back in a rolling, cascading action *(1)*. Obviously, as the diameter of the mill is enlarged, the free fall distance, hence the potential energy, of the balls increases. Differences in the severity of attrition which are shown in Figure 8, are, therefore, largely associated with differences in mill diameters: 8 inches in the case of the 1¼ gallon assay jar, and 15 inches for the 17 gallon mill.

Carbon black tends to cake much less in larger than in smaller mills. This is probably due to the increased magnitude of vibrations in larger mills due to the higher impact energy of the balls. Caking, which is frequently a critical problem in assay jar operation, can be reduced, for example, by tapping the jar sharply with a hammer while the mill is in motion.

Caking in small mill operation is reduced to a minimum if the black is dried prior to ball milling. In the absence of free or absorbed water, the black remains free flowing and active. To illustrate, FEF black was ball milled for 24 hours without drying in a 1¼ gallon assay jar. Its surface area was increased from 47 to 88 M^2/g, and its oxygen content increased from 0.45 to 0.90 per cent by weight. The same black, dried by heating for 24 hours in an air oven to 135° C. before ball milling, gave surface area increases from 48 to 117 M^2/g, and oxygen content increases from 0.47 to 1.69 per cent by weight.

Greatly Improved Quality

Particular attention is called to the magnitude of the surface area changes shown in Figure 8. This is truly a remarkable result. It suggests the possibility for producing a series of rubber blacks with a wide range of surface area and surface activity characteristics, perhaps some ink blacks as well, from a single, relatively inexpensive thermal carbon. The greatly improved quality found in these modified blacks, it would seem, should more than justify the costs of attrition. Further comment on this point will be made in a later section dealing with butyl.

Data in Table II give the effect of ball milling time on the properties of nine different carbon blacks which were studied in our work. This is a summary table presented for those who may be interested in a more detailed account of some of the actual experimental runs. Results are reported for standard assay jar operation (1¼ gallon volume) with black predried in an air oven for 24 hours at 135° C. A second column of data for two of the blacks (Thermax and P-33) shows results obtained from operations in the 17 gallon ball mill using 10 lb. of black per run.

The severe attrition of carbon black is accomplished very quickly when the dry black is passed

through the nip of a tightly set rubber mill. Table III shows data obtained from this kind of operation with FT black. In the experiment, 300 gram portions of the black, predried by heating for 2 hours in an air oven at 135° C., were passed 2, 5 and 10 times, through the nip of a 6 x 12-inch rubber mill. The rolls were heated with internal steam to 300° F., and were set for 0.006 to 0.007 inch clearance. On the average, 20 seconds were needed to make each pass. As the black fell from the nip of the mill to the pan below, its temperature was recorded after each pass.

The surface area of the black is increased fourfold after 5 passes, and almost sixfold after 10 passes. This total change, obtained after only 3-1/3 minutes of actual milling time, is equivalent to the change yielded after 6¾ hours in a 17 gallon ball mill or 46½ hours in a 1¼ gallon assay jar (see Figure 8). The increases in oxygen content, similar to those in ball milling, are directly proportional to the increases in surface area. The slope of the line, however, is somewhat steeper, more oxygen apparently being combined per unit of surface area increase than in the case of ball milling. This result, which probably is related to availability of oxygen in the process, is not intrinsic, since the oxygen supply can be varied in both mechanical systems.

Of particular interest in Table III are the temperatures which were found for the black after each pass through the mill. The temperature of the black rises sharply in the first few passes, reaching 655° F. on the fourth pass, and 705° F. on the fifth. After this time, the temperature remains level, varying only between 695° and 720° F. This surprisingly high temperature, it is believed, is not due to frictional heat alone, but rather to the combined heats of friction and exothermal oxidation of the black. A dehydrated silica (Cabosil), for example, is not heated above 450° F. in a similar set of runs.

Data in Table IV show the effect of roller mill attrition on HAF black. In general, the results are similar to those reported for FT black in Table III. After only 4 passes the surface area is slightly higher than that obtained by 24 hours of ball milling in the laboratory assay jar (Table I).

The work this time was done with a single 1,000 gram portion of black, 200 grams being taken out after one, two, and four passes. Because oxidation initiated by attrition requires continuing contact of oxygen with the black, the use of a larger mass of black in this experiment apparently limited the process. Diffusion was more difficult than in the FT black run reported above. As a result, the black had less opportunity to combine with oxygen than the above mentioned FT black, or even the corresponding ball milled HAF black (Tables I, III, and IV).

TABLE III—EFFECT OF ROLLER MILL ATTRITION ON SURFACE AREA AND OXYGEN CONTENT OF FT BLACK

No. of Passes	Temp. of Black (° F.)	Surface Area (M^2/g)	Weight % Oxygen
0	—	15	0.25
1	255	—	—
2	565	21	0.53
5	705	60	1.01
10	715	87	1.52

TABLE IV—EFFECT OF ROLLER MILL ATTRITION ON THE SURFACE AREA, OXYGEN CONTENT AND pH OF HAF BLACK

No. of Passes	Surface Area (M^2/g)	Weight % Oxygen	Slurry pH
0	80	0.64	7.00
1	113	0.88	5.08
2	128	0.97	4.06
4	146	1.43	3.70
7	164	1.56	3.70

The need for dry black in these roller mill experiments must be emphasized. If the black contains free water, it is literally exploded from the mill nip by the instantaneous and violent vaporization of the water. Dried black, on the other hand, falls directly to the mill pan with little or no attendant dust problem.

ACKNOWLEDGEMENT

The author is indebted to E. N. Dannenberg of the Godfrey L. Cabot laboratories for the photomicrographs in Figure 2, and to Z. W. Wilchinsky of the Esso Research laboratories for the measurements of X-ray diffraction. He, likewise, gratefully acknowledges helpful discussions with others on the Esso staff—J. Rehner Jr. and F. P. Baldwin. He is most especially indebted to J. C. Scarpa for assistance in carrying out the experimental work.

LITERATURE REFERENCES

(1) Paul O. Abbé, Inc., Ball and Pebble Mills, "Catalog Y".
(2) Brunauer, S., Emmet, P. H. and Teller, E. J., *J. Amer. Chem. Soc.*, Vol. 60, p. 309 (1938).
(3) Sweitzer, C. W. and Goodrich, W. C., *Rubber Age*, Vol. 55, p. 469 (1944).
(4) Ladd, W. A. and Wiegand, W. B., *Rubber Age*, Vol. 57, p. 299 (1945).
(5) Smith, W. R., Thornhill, F. S. and Bray, R. I., *Ind. & Eng. Chem.*, Vol. 33, p. 1303 (1941).
(6) Smith, W. R. and Polley, M. H., *J. Phys. Chem.*, Vol. 60, p. 689 (1956).
(7) Dannenberg, E. M. and Boonstra, B. B. S. T., *Ind. & Eng. Chem.*, Vol. 47, p. 339 (1955).
(8) Pike, M., and Watson, W. F., *J. Polymer Sci.*, Vol. 9, p. 229 (1952).
(9) Watson, W. F., "Proc. Third Rubber Technol. Conf., 1954," Cambridge, W. Heffer and Sons, Ltd.; *Ind. & Eng. Chem.*, Vol. 47, p. 1281 (1955).
(10) Watson, W. F., *I. R. I.*, Vol. 34, p. 237 (1958).
(11) Kraus, Gerald and Collins, R. I., *Rubber World*, Vol. 139, p. 219 (1958).
(12) Warren, B. C., "Proc. of the Conferences on Carbon," Univ. of Buffalo, Buffalo, N. Y., 1956.
(13) Sweitzer, C. W. and Heller, G. L., *Rubber World*, Vol. 134, p. 855 (1956).
(14) Schaeffer, W. D., Smith, W. R. and Polley, M. H., *Ind. & Eng. Chem.*, Vol. 45, p. 1721 (1953).
(15) Dobbin, R. E. and Rossman, R. P., *Ind. & Eng. Chem.*, Vol. 38, p. 1145 (1946).

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SYSTEMATIC CONTROL OF

Rubber-to-Metal Adhesion

IN THE WIRE AND CABLE INDUSTRY

Preparation of metal surfaces before applying adhesives is as essential to wire processing as to molded goods making.

THIS discussion is concerned with basic elements in rubber-to-metal bonding, specifically as they apply to the wire and cable industry. In the mechanical goods industry, dependable rubber-to-metal adhesion is obtained with adhesives. Bonding procedures may differ greatly from those employed in the wire and cable industry, but the same physical, chemical and thermodynamic principles apply to all rubber bonding processes. An understanding of these principles is necessary for proper bonding operation and control.

Factors in Bonding Conductors

A typical problem is posed by insulation compounds bonded to conductors. Examining the various interfaces it is necessary to consider the following six factors: (1) cleanliness and chemical nature of the metal surface; (2) suitability of the adhesive; (3) uniformity and dryness of the adhesive layer; (4) composition and history of the rubber stock; (5) completeness of wetting at the interface between the adhesive and rubber, and (6) adequacy of heat flow to accomplish vulcanization of both rubber and adhesive.

If the enumerated factors can be stabilized, control of the level of adhesion depends on regulating the amount of chemically active adhesive on the clean wire surface. This can be done by varying the degree of dilution of the adhesive. With reference to the factors affecting adhesion, let us first consider the myriad differences possible in composition of rubber stocks. In the continuous vulcanization process, such stocks are generally formulated for very fast curing. However, the cure rate is not necessarily faster than that of mechanical goods stocks which produce rubber-tearing bonds.

While the insulation compounder works within limits imposed by requirements for smooth extrusion and safe factory processing, the mechanical goods compounder, working on small parts, must use fast cures in an attempt to keep press time at a minimum. Both may compound stocks requiring the same absolute cure rate. If both types of stocks are cured at the same temperature, the optima and the time-temperature integrals may be quite close.

Many present day adhesives, being highly chemically reactive, are governed by the same time-temperature relationship that applies to the curing systems in the rubber stocks. The adhesives will cure as fast, or faster, than the fastest rubber stock. A high-temperature short cure can be just as effective as a longer cure at a lower temperature, provided that the heat reaches the adhesive interface. Often an undercured condition exists in the rubber near the adhesive layer when CV units are run at top speed. Using a fast curing rubber stock, it is important to guard against scorching from excessive processing or bin aging. If cure has started, the ability of the rubber to bond and chemically wet an adhesive layer will be seriously impaired.

Rubber Compounding Considerations

Compounding rubber stocks for good adhesion is considerably simpler when adhesives are being used, compared to brass plate as the bonding medium. Because of their chemical activity, many adhesives are more adaptable to difficult stocks than brass plate, and their performance is more dependable. Some general compounding principles follow, with the reminder that what is good for bonding may not necessarily be good electrically.

A discussion of basic bonding procedures

In summary, the author believes that there are many elements common to adhesive bonding in both the mechanical molded goods industry and the wire and cable industry. He has listed some of the major factors in regard to compounding. He does not believe that the rate of cure is a problem, but that heat transfer may be. It is his opinion, however, that cleanliness of the metal surface is of vital importance, and that we need to learn more about the behavior of wet adhesive when it meets hot, moving rubber under high pressure. If other factors can be held constant, adhesion level can be controlled by selection and dilution of the adhesive.

In the November, 1959, issue of RUBBER AGE, a new method of adhesion testing was outlined by G. W. Painter of Lord Manufacturing Co., Erie, Penna. Using this test, Mr. Stout found that even an excellent adhesive system can be made to break at the bond. A higher degree of reproducibility can be obtained than with the ordinary peel test, or with any other test that he knows.

It is well known that large amounts of plasticizers can give adhesion difficulty, and that ingredients that will bleed should be minimized. In styrene rubber stocks, either highly paraffinic or aromatic oils give more trouble than do oils of medium aromatic content. This is probably the case because the highly paraffinic oils show decreased solubility in the rubber and tend to bleed, while highly aromatic oils exert a solvating effect on the adhesive and, in some instances, even completely dissolve it away. Waxes, polyethylene and some antiozonants frequently behave in the same manner as paraffinic oils.

Where large amounts of oils are necessary, we have shown that it is generally better for adhesive purposes to add oil to normal styrene rubber than to reach the same final oil content by adding extra oil to an already oil-extended polymer. In one situation, a stock having a 45 per cent total oil content, based on the rubber hydrocarbon from an oil-extended styrene rubber, gave marginal bonding. By switching to a non-oil extended polymer as the starting material, we were able to add 90 per cent of oil before getting into difficulty. We have also found that some help can be obtained by using a small proportion of ester-type plasticizer along with the medium aromatic oil.

If all other elements in the styrene rubber stock formulation are equivalent, polymers with low, bound styrene will generally give better results than those with a high proportion of styrene. The presence of at least 20 parts of carbon black, particularly channel black, will enhance the bondability of a stock. Where applicable, the same general principles of compounding stated for styrene rubber also hold for natural rubber.

Neoprene, Nitrile and Butyl

In neoprene, bleeding of partly soluble plasticizers may cause trouble. Most ester-type plasticizers give good results but, unfortunately, several which are usually used for low temperature service (methyl acetyl ricinoleate, dibutoxy ethoxy ethyl formal, tributoxy ethyl phosphate, and one or two proprietaries) can be detrimental. Normally, compromise blends with phthalate or other esters can be worked out. Sulfur-modified (Type G, GN, etc.) neoprene gives easier bonding than does the non-sulfur bearing polymer (Type W, WRT, etc.). However, many good bonding, sulfurless Neoprene Type W stocks are in use today.

When compounding nitrile rubbers, the same problem with low-temperature plasticizers occurs. Stocks made from polymers with high acrylonitrile content are usually easier to bond than those with low content, as long as the plasticizer tolerance of the stock is not exceeded.

In butyl compounding, the use of the high, unsaturated polymer gives far better results than the low. This may be due to the chemical nature of the adhesive bond. Similarly, heat treatment during the mixing cycle is undesirable for bonding. The chemical reactivity of the butyl polymer is altered, and the number of active centers available for chemical bonding with the adhesive is reduced. Use of more than .5 per cent of the aromatic nitroso amine, heat-treating agent may lead to difficulties.

As with styrene rubber stocks, we have found it desirable to include a small proportion of ester plasticizer, particularly pelargonates. The use of paraffinic or highly aromatic oils is preferred to medium aromatic oils. If the butyl stock is to be resin-cured, stannous chloride activation should be avoided. A polymeric source of halogen such as Hypalon, which releases chloride at a controlled rate, is recommended for good bonding.

Preparing Metal Surfaces

The most important of all the factors in variable adhesion for wire and cable operations consists in the preparation, or lack of preparation, of the metal surface before application of the adhesive. In the mechanical molded goods industry, it is axiomatic that very careful surface preparation is one of the most important elements in obtaining high-strength or rubber tearing bonds. The molded goods operators

use grit blasting as well as degreasing, either by solvents or aqueous alkaline materials. Many operators use primers on the metal as a safety factor to overcome deficiencies in preparation and to insure the best possible adhesion at the metal-adhesive interface.

Unfortunately, the mode of operation in the wire and cable industry normally precludes even what the rubber molder would consider a bare minimum of surface preparation. Removal of loose particles, lubricants, rust preventatives and just plain dirt, must be thorough before the adhesive can contact a tight metal surface. The adhesive will usually stick to whatever it contacts, but if the contacted layer has no strength, such as a layer of powder or grease, the break will come within that layer. A faulty tinning job that leaves platelets likely to peel is a frequent offender.

It is common to see stripped down wires with bright particles of metal transferred to the rubber, or a greasy surface remaining on the wire with the adhesive stuck to the rubber. The mechanism of such failure is evident. Roughening of the metal surface is sometimes helpful, except where material is loosened but not removed, and the loose particles form a false bonding surface.

Cleaning the surface with solvent is frequently desirable, particularly if the deposit is oily. Care must be taken to insure that the solvent is clean, for a dirty solvent merely evens out the oily deposit rather than removing it. It is regrettable that solvents will not remove all deposits, but with some knowledge of the type of soiling to aid in solvent selection a real advantage can be gained.

Water-based cleaners have been used, but they involve the difficulty of requiring a rinse and drying period. Flame treatment is very effective on some soils. Unfortunately, on some materials, notably steel, a flame will produce a thin coating of powder, usually metal oxide, which makes a poor base for bonding.

Technique of Applying Adhesive

The technique of applying the adhesive is extremely important. The adjustment of wiping sponges, felts or diaphragms for CV operation is most critical. The sight of excellent adhesion on one side of a wire and no adhesion on the other, can frequently be traced back to a wiper that puts the right amount of adhesive on one side of the wire while it rubs the other side clean.

The viscosity of an adhesive, as controlled by dilution with a solvent, is important, because the more viscous the adhesive, the more accurately it can be controlled by the wipers and the greater tendency it has to stay in place on the wire. A very thin adhesive is more apt to be completely wiped away and, should a heavy coat of it be used, will run and collect in droplets.

Dilution of an adhesive supplies a mechanism for controlling the adhesion level. It is easy to demonstrate with active adhesives that, as the thickness of the adhesive film decreases, the level of strength also decreases. This is in line with the ability of the adhesive to react chemically with the rubber stock. The more reactants present, the greater the strength at the adhesive-rubber interface. The amount of adhesive required to give a rubber tearing bond depends mostly upon the selection of adhesive and the composition of the particular rubber stock.

Certain commercial adhesives of wide versatility and high chemical reactivity perform more consistently when diluted than others. In one situation which we studied, several adhesives all gave rubber tearing bonds at normal concentration and film thickness. All were then tested at greater and greater dilutions on the same rubber stock. One chemically active adhesive gave reproducible and intermediate adhesion values even on greatly diluted samples. Other adhesives became erratic even when only diluted a little, and completely lost ability to bond after moderate dilution. Thus, if other elements in the system can be held constant and a capable adhesive used, intermediate degrees of adhesion can be obtained by diluting the adhesive to an appropriate level.

Choosing the Best Lubricant

The question of wet versus dry adhesive entering the extruder is extremely complex. There is no doubt that a dry adhesive will give the best adhesion to metal. Use of wet adhesive permits the sweeping action of moving rubber in the extruder to wipe the adhesive off the wire. It may be absorbed by the rubber. The volatility of entrapped solvent may promote the formation of blisters at the metal-adhesive interface.

Nevertheless, the need for lubrication at the entering tip of the extruder cannot be overlooked; therefore, use of wet adhesive to perform this lubricating function is frequently necessary. In some cases, use of a solvent or a second coat of adhesive as a lubricant over already dried adhesive is beneficial. The best lubricant should be a poor solvent for the adhesive but a good solvent for the stock. In this case, the solvent is absorbed by the rubber and does not migrate through the adhesive to cause softening at the metal interface.

Speaking as adhesive suppliers, we believe that the question of what happens at the first instant the adhesive-coated wire enters the extruder is worthy of careful study. Residual solvent, melt viscosity, rheological behavior of thin films under pressure and other less obvious factors provide areas for continuing investigation.

The selection of an adhesive for use in a wire and cable operation must be proven ultimately by actual running on a production machine. In situations where a number of adhesives must be screened against different rubber compounds, a peel test which can be performed on press cured slabs may be helpful. The advantage is one of reproducibility, which is an aid in discriminating between systems of nearly equivalent performance. By a peel test, it is possible to obtain both a measure of pull value, as well as seeing an example of the type of break to be obtained.

design & application of

Latex-Coated Cables for Missile Systems

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THE APPLICATION of natural rubber latex as an insulating compound for wire and cable began in the late Twenties when knowledge of colloidal chemistry, through intensive basic research, resulted in a better and more nearly complete, fundamental understanding of the nature of latex. From this basic work evolved the methods of preservation, purification and compounding which eventually led to the extensive use of latex as an electrical insulation. In its infancy, latex was not normally employed as a primary insulation but as a saturant for both paper and cotton.

Continued development work resulted in improvements in the techniques of purification, compounding and application, and permitted the use of latex as a primary insulation in the middle Thirties. At that time, it became evident that this new type of insulating material had special electrical and physical characteristics which were not attainable with other types of insulating media then in use. These properties permitted the use of relatively thin walls of insulation, ranging from 1/64 to 2/64 inch, where 3/64 and 4/64 had formerly been required. Such smaller diameters and reduced weights proved particularly welcome where a large number of conductors was involved in one cable.

Since the various branches of the Armed Forces are always looking for small diameter and light-weight cable to do a given job, cables with latex insulation were adopted for many applications. Many commercial enterprises have also successfully used numerous types of latex cables in large volume. From the early Forties to the present, continual improvements in the electrical properties of the latex compound and method of application resulted in increased acceptance of this type of insulation for the complicated cables used by the Signal Corps, Ordnance Department, Air Force, Navy and other government agencies.

Note: This paper was presented at the Eighth Annual Wire and Cable Symposium of the U. S. Army Signal Research and Development Laboratory, in Asbury Park, N. J., December 1-3, 1959.

Latex Compounding for Insulation

The compounding of raw latex for use as an electrical grade insulation involves three basic steps: The first consists of concentrating, purifying and stabilizing the latex as received from the plantations. The second step involves the proper choice and balance of compounding ingredients in order to maintain as high a percentage of rubber as possible for maximum electrical and physical properties. The third step covers the dispersing of all compounding ingredients, using water as the dispersing medium and non-water soluble or volatile type dispersing agents.

Natural rubber latex as received from the plantations contains excessive amounts of water soluble materials in the form of proteins and soaps. These undesirable materials must be removed to produce a high electrical grade insulation by either repeated centrifuging or creaming of the raw latex. The latter is the more common practice. Briefly, creaming entails repeated dilution and concentration, expelling the watery serum after each concentration. In order to reduce the time required for this cycle, moderate heat and thickening agents are used. The function of the thickening agent is to form a reversible agglomeration of the rubber particles which slow down the Brownian movement, thereby rendering faster creaming.

Normally, three creaming cycles are required to reach the degree of purification that assures optimum electrical properties. This procedure requires careful heat and pH control to avoid coagulation of the rubber particles. The degree of purification obtained by multiple creaming, as measured by the mechanical water absorption of the final latex compound, is shown in Table I.

Compounding of rubber latex requires a practical knowledge of the principles of colloidal chemistry, particularly that of maintaining the stability of the latex during and after compounding and subsequent processing. This involves the use of volatile type stabilizers and careful pH control of the compounded

latex dispersion up to the point of application to the wire. In latex as contrasted to dry rubber compounding, all ingredients must be in the wet state as dispersions, emulsions or solutions, having water as the dispersing medium to permit efficient mixing with the purified raw latex.

Approximately 8 per cent of compounding ingredients are added, resulting in a compound having a rubber content of 92 per cent by weight. This high content of unmasticated rubber accounts for the excellent physical and electrical properties of latex insulation. They permit the use of thinner walls of insulation in control cable design with a resultant reduction in cable diameter and weight. Conversely, for a cable of limited diameter, a greater number of conductors can be provided using latex insulation.

Jackets Protect Against Degradation

As with any natural rubber insulation, latex is susceptible to degradation when exposed to certain environmental conditions such as sunlight, ozone, oils, etc. Such conditions do not prevail in most cable applications; consequently, the rubber insulation in multi-conductor cables does not require any more protection than is normally afforded by conventional braids and cable jackets. However, it is at times desirable to provide a greater degree of protection to the rubber insulation for special extreme exposures. This requirement has led to the development of highly effective, thin-wall, protective jackets or coatings applied over and bonded to the underlying latex insulation.

Such coatings, which are approximately 3 mils thick, are applied to the latex insulation by the dip process prior to the vulcanization of the compound. Thus they become an integral part of the insulation. The bonding of the two dissimilar components is accomplished by the use of one or more blend dips of the two materials. This technique of bonding incompatible materials without resorting to the use of adhesives or solvents is protected by U. S. Patents.

Three materials have been used successfully on numerous signal, control and missile cables, especially the ground control cables for the Thor missile project. These are neoprene, PVC polyblends and the recently developed butadiene-high acrylonitrile latices. Both the neoprene and the nitrile types are compounded and cured to produce a high tensile strength covering. The polyblends are compounded for improved processing and optimum fusion of the vinyl particles.

TABLE I—EFFECT OF MULTIPLE CREAMING ON MECHANICAL WATER ABSORPTION

Number of Creaming Cycles	7 Day—70° C. Gravimetric Water Absorption Test (mg./sq. in.)
1	70
2	27
3	15
4	13

TABLE II—COMPARATIVE RATINGS OF LATEX AND LATEX COATINGS

Properties	Rubber Latex	Protective Coating	Rubber Latex plus .003 in. Protective Coating
Physicals (tensile strength and elongation)	Excellent	Good	Excellent
Electricals (I.R., S.I.C., etc.)	Excellent	Good	Excellent
Ozone Resistance	Poor	Excellent	Excellent
Oil Resistance	Poor	Good to Excellent	Good to Excellent

Achieving Optimum Usefulness

A survey of the unique properties attainable by using latex insulation with a protective jacket clearly reveals the advantages obtained. The comparative ratings of the electrical, physical and weathering properties of each component are shown in Table II. Latex, by itself, has excellent physical and electrical properties, but poor ozone and oil resistance. The protective coating, by itself, has good physical properties, excellent ozone and oil resistance, but poor electrical properties. By combining the two materials only the weaknesses of each component are eliminated. The good properties of each—namely excellent physical, electrical, light checking, ozone and oil resistance are retained by the composite insulation.

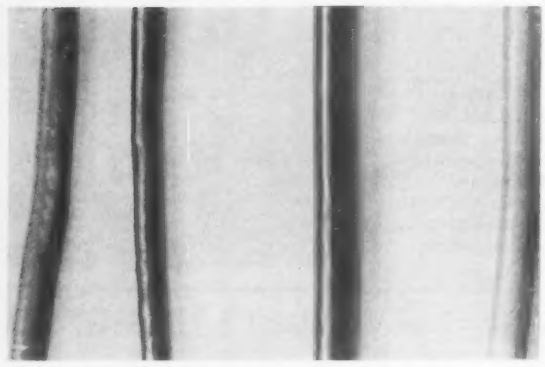
The effectiveness of the 3 mil coating in preventing degradation of the insulation from the effect of weathering, ozone and oil is illustrated in Figures 1, 2 and 3. In applications that do not subject the cable to excessive mechanical abuse, as is the case with the non-portable control, fire alarm, telephone and utility control cables, the terminated ends may be exposed to excessive moisture, light ozone or oil. In these cases the protective coating is used to replace the conductor braids, permitting greater reduction in cable diameter and providing increased protection.

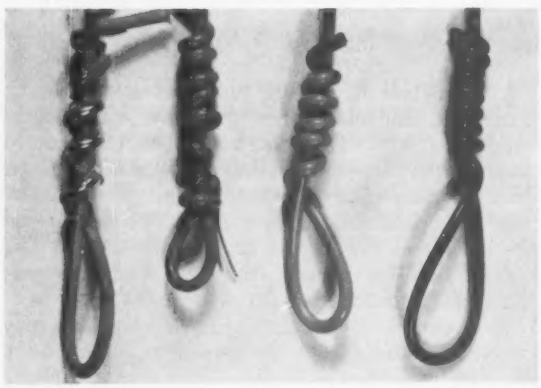
In portable cable applications, such as Ordnance and missile cables which are frequently subjected to mechanical abuse, the protective coating and braids are both normally employed. This type of construction provides additional protection from the effect of ozone, oil, etc., because of the protective coating, and additional mechanical protection because of the braid, without sacrificing desirable properties of the cable.

Coating and Vulcanizing Cycle

In applying latex to wire, careful control of solids, pH and viscosity of the compound is essential. Here again knowledge of colloidal chemistry plays an im-

Latex Coatings Afford Superior Protection





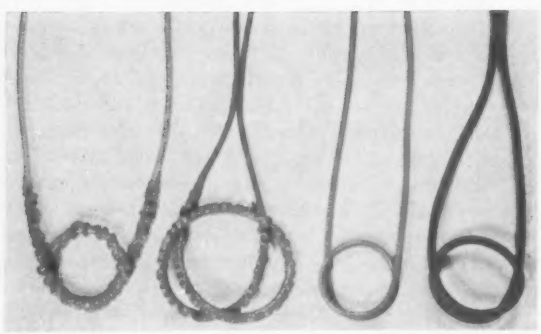


FIG. 1—Photographs show effectiveness of 3 mil cable coating after 400-hour exposure in an Atlas twin-arc Weatherometer. Left to right: plain latex has more than 60 per cent loss in tensile strength, latex neoprene less than 10 per cent, latex nitrile and latex PVC less than 5 per cent.

FIG. 2—Samples after a 3-hour ozone test at .028 per cent concentration again show protection of 3 mil coating. Left to right: Plain latex, latex neoprene, latex PVC and latex nitrile.

FIG. 3—The 3 mil coating is also effective after an 18-hour oil immersion test at 121° C. In the usual order: plain latex, latex neoprene, latex PVC and latex nitrile.

portant part in the use of volatile type stabilizers and viscosity control of the compound. The process used to apply latex is rather unique and requires considerable technical know-how and control. Briefly, the compound is applied as shown in the schematic diagram in Figure 4.

The bare wire is fed into an applicator containing the unvulcanized compound. It then emerges vertically into a drying chamber, where the latex is heat coagulated and dried before it comes into contact with top tower sheaves. It is returned for another dip and again passes vertically into the drying chamber. This cycle is repeated until the desired thickness of insulation has been obtained. The insulated wire is then passed through the vulcanizer tube, in which the temperature has been adjusted to properly vulcanize the insulation into a single homogeneous coating. In the case of composite insulation, the protective coating compound is applied to the unvulcanized latex insulation by replacing the last three dips of latex with one dip of a binder and two dips of coating compound. The composite insulated wire is then vulcanized.

Latex insulation has a number of desirable physical and electrical properties because of its high rubber content and method of application. With the recent development of protective coatings, better environmental protection can also be included among its outstanding characteristics. With the multiple dip process, it is possible to obtain excellent centering and excellent physical properties because severe mechanical stresses of the rubber are eliminated. Excellent electrical properties are obtainable due to the purification of the rubber latex and low percentage loading of compounding ingredients. The good electrical properties permit the use of thinner walls of insulation, giving a substantial reduction in diameter and weight.

Two types of latex compounds are available—one rated for a maximum conductor operating temperature of 60°C. and the other, a heat-resistant compound rated for a maximum conductor operating temperature of 75°C. Typical properties of these two compounds are shown in Table III.

Custom Production for Missiles

Latex insulation is being used for many, diversified, commercial applications. It has proven itself under extreme service conditions in fire alarm, police and traffic signal cables, multi-conductor control cables, and portable cords and cables. However, its use in a large number of special cables for the Armed Forces is perhaps the best tribute to its excellent performance. Tremendous quantities of such wire and cable have been used with practically no known or reported failures, despite the mechanical abuses to which they were subjected.

As technology of weapons systems progressed from the electrically controlled artillery pieces to the original Nike systems and on to the present guided missile systems, mechanical and electrical requirements for the supporting ground control cables became more stringent while cable designs became more complex.

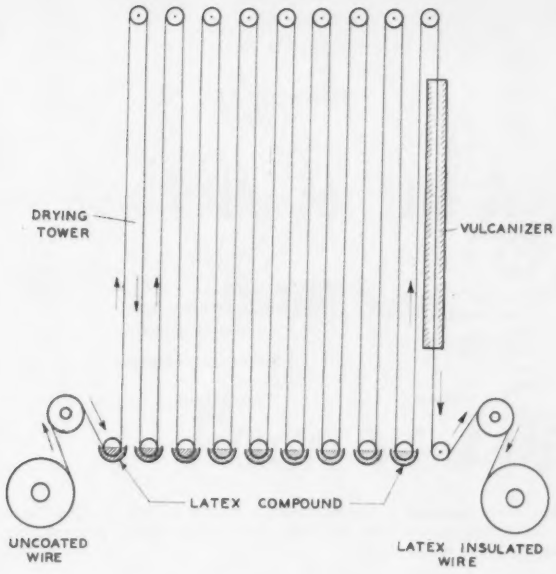


FIG. 4—A schematic diagram summarizes the main features of the latex coating process.

The versatility of latex made the design and construction of these complex cables possible.

Latex ground support cables (marketed as "Laytex" by Kaiser Aluminum and Chemical Corp.) have been supplied for the following missile systems.

Nike	Corporal	Mace
Nike Ajax	Redstone	Jupiter
Nike Hercules	Matador	Snark
Nike Zeus	Thor	Titan
Talos	Lacrosse	Vanguard

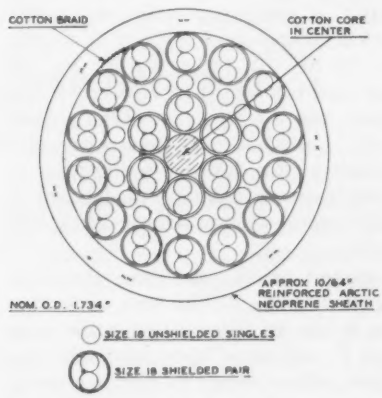
Some other systems have utilized such cables supplied by sub-contractors. At Kaiser, we have designed, within the past three years, over 650 different cables specifically for use on missile systems or companion equipment. Each one of these designs follows the general provisions of Frankford Arsenal Specification MIL-C-13777.

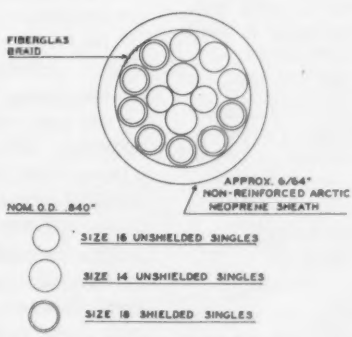
We have selected six typical cable designs, now being used in missile systems, to illustrate the variety of circuits possible within one cable configuration. The one shown in Figure 5 is composed of 60 conductors and was designed for the Redstone-Jupiter missile. Makeup consists of 20 No. 18 unshielded singles and 20 No. 18 twisted pairs shielded. All conductors are latex insulated and covered with a lacquered, colored rayon braid which provides identification and mechanical protection. In addition, a rayon braid is applied over the shielded components to provide extra mechanical protection. A reinforced low-temperature, neoprene jacket of 10/64 inch thickness is employed as the outer covering. Cable circuitry is used for the transmission of signal or control data and is rated for 600 volt service at temperatures varying from —65° to +160°F.

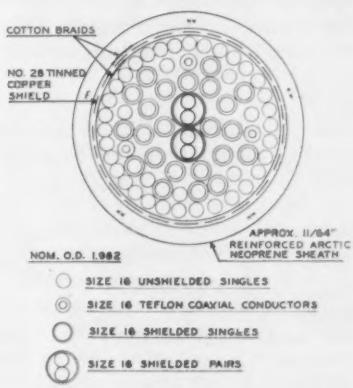
Matador, Mace and Thor

Figure 6 depicts a cable with 14 conductors, designed for the Martin Matador system. There are 7 No. 18 shielded singles, 5 No. 16 unshielded and 2 No. 14 unshielded singles in this construction. All conductors are insulated with latex and have a rayon braid protective covering over the insulation. Jacket material is low-temperature neoprene. Cable circuitry is used for signal transmission of ground circuits. The cable is designed for severe flexing service and must withstand frequent handling, abrasion and mechanical abuse, with constant exposure to weather and temperatures varying from —65° to +160°F.

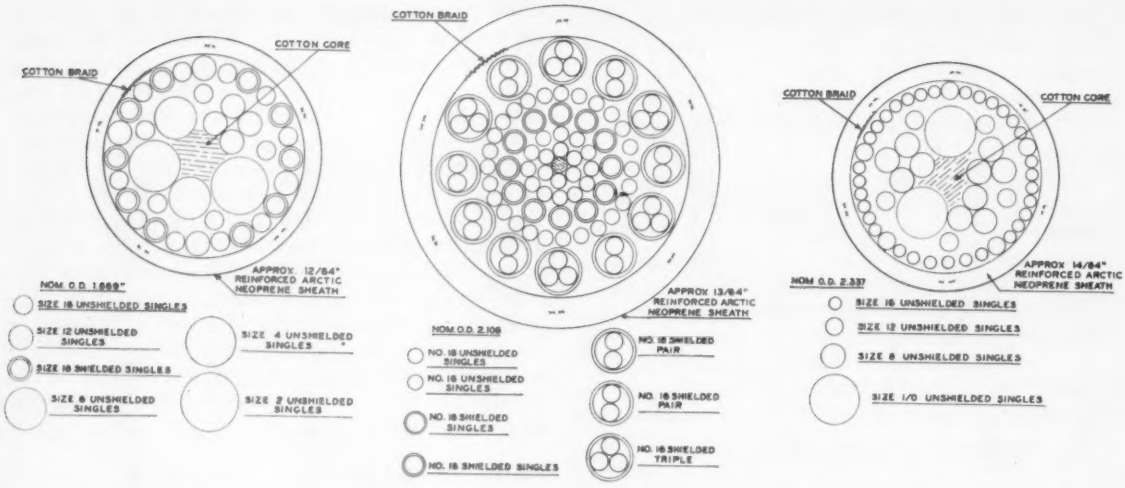
The cable construction shown in Figure 7 comprises 70 conductors and was recently designed for the Martin Mace program. Cable makeup consists of 40 No. 16 unshielded singles, 22 No. 16 shielded singles jacketed, 1 No. 16 shielded and jacketed power lead, 2 No. 16 twisted pairs shielded and jacketed, and 3 No. 16 teflon low-capacitance wires. With the exception of the low-capacitance components, conductors are insulated with latex, rayon braided for polarity, and have polyvinyl chloride jackets over the shields. The shield jacket is rated for either 300 or 600 volts






COTTON BRAIDS
NO. 28 TINNED COPPER SHIELD
APPROX. 11/64" REINFORCED ARCTIC NEOPRENE SHEATH
NOM. O.D. 1.982
SIZE 16 UNSHIELDED SINGLES
SIZE 16 TEFLON COAXIAL CONDUCTORS
SIZE 16 SHIELDED SINGLES
SIZE 16 SHIELDED PAIRS

Left to Right: FIG. 5—This diagram represents the 60-conductor cable designed for the Redstone-Jupiter missile. FIG. 6—A schematic diagram of the cable used for the Martin Matador shows its 14 conductors. FIG. 7—Seventy conductors are found in this cable, recently designed for the Martin Mace program.



Left to Right: FIG. 8—The Thor missile system utilizes this 37-conductor cable jacketed in low-temperature neoprene; FIG. 9—The Thor system also requires the heavy-duty, 84-conductor cable shown in cross-section above. FIG. 10—This 54-conductor cable, also for the Thor, was especially designed for arctic and tropic duty.

depending, of course, on the vinyl thickness. Jacketing material is low-temperature neoprene. In service, this cable is used for the transmission of communication and signal data, is rated for 600 volt service, and must be operable at —65° to +160°F.

Figure 8 illustrates a cable with 37 conductors, designed for the Thor missile. The conductor components are 15 No. 16 unshielded singles, 10 No. 16 shielded singles, 8 No. 12 unshielded singles, 2 No. 6 unshielded singles, 1 No. 4 and 1 No. 2, both unshielded. The conductor insulation is a latex neoprene composite for the control wires and a 40 per cent natural rubber for the power leads. The neoprene coating, which is applied directly over the latex, provides a composite insulating material combining the excellent physical and electrical properties of the insulation with the high ozone and oil resistance of the neoprene. A rayon braid covering is used over the insulated control wires. Over the shields of the shielded conductors and under the outer mechanical barrier braid, a Mylar spirally applied tape is incorporated to allow low-voltage application on the shield. The cable jacket is low-temperature neoprene. In service, the cable is used for the transmission of signal and communication data and is exposed to temperatures ranging from —65° to +160°F.

The total number of conductors in the construction outlined in Figure 9 is 84, designed for the Thor missile, too. Conductors consist of 16 No. 16 unshielded singles, 1 No. 16 shielded single, 1 No. 16 twisted pair shielded, 5 No. 16 triples shielded, 27 No. 18 unshielded singles, 11 No. 18 shielded singles and 6 No. 18 twisted pairs shielded. All conductors utilize latex-neoprene composite insulation, rayon braid coverings over insulation, and spirally applied Mylar tape over the shields and under the outer, mechanical barrier braid. Low-temperature neoprene is used as the jacketing material. This cable is designed for heavy-duty, portable service and for the transmission of signal and control data at temperatures ranging from —65° to +160°F.

Finally, Figure 10 has a diagram of a cable with 54 conductors. It was also designed for the Thor system. Complexity of design is exhibited by this construction which is composed of 2 No. 1/0 singles, 10 No. 8 singles, 10 No. 12 singles and 32 No. 16 singles. Insulation used is a latex-neoprene composite on the control wires and 40 per cent natural rubber on the power leads. Cable jacket is low-temperature neoprene. This cable is also designed to function as a heavy-duty, portable control and power cable and to transmit signal and communication data in arctic and tropic environments.

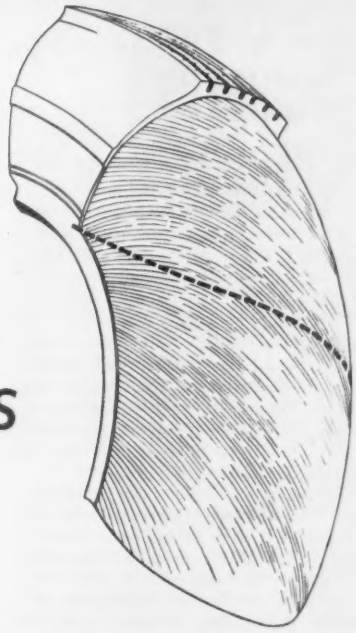
The portable ground cables, like those described here for use with missiles, are the life lines of the systems. Success or failure of any mission undertaken with these systems is dependent upon successful operation of the cables. There should be no compromise in the design or the materials used in any of the components of these cables which will in any way jeopardize reliability.

TABLE III—TYPICAL PROPERTIES OF LATEX INSULATIONS

	No. 90 Latex	No. 91 Latex (Heat Resistant)
Tensile Strength (psi)	5,000	4,000
Elongation (%)	900	900
Set (in.)	1/64	1/64
S.I.C.	2.6	2.6
Power Factor (%)	0.7	0.7
I.R. Constant	50,000	12,000
Voltage Breakdown (volts/mil—.015 in. wall)	500	500

New Paths for Tire Cords through . . .

FUGITIVE LUBRICANTS



The dotted line shows the path a cord takes in a standard tire section when a fugitive lubricant allows it to slide sideways as it is drawn tight. This path is called geodesic because, in the arched surface of a tire, it is the shortest distance between the two bead-anchored ends of a cord. It is the opposite of the curvature which conventional tire building imparts.

Stearic acid increases filament reinforcement, then "disappears" during vulcanization

A RESEARCH team working on tire developments at Du Pont's Industrial Products Research Laboratory near Wilmington, Del., has discovered a new use for a familiar fugitive lubricant—stearic acid. When properly utilized in the tire fabrication process, this lubricant can produce startling changes in the path which the cord normally assumes as it runs from one tire bead to another.

Normally cords follow a curved path that results from the so-called pantographing or expansion of the tire carcass. When the stearic acid lubricant is applied, the cords no longer pantograph as the tire is expanded. Instead, they are able to follow the shortest path from bead to bead, called the geodesic. This path is also curved but has quite a different shape from the pantographic.

Equalizing Cord Tension

In the geodesic path, the cords lie more transversely across the crown of the tire than in the sidewalls. In a conventional tire, on the other hand, the manufacturing process positions the cords in the opposite way, so that they lie closer to the long circumferential direction in the crown. Furthermore, if the cords follow the geodesic pattern, the tension in the cords is uniform from crown to bead, while the tension in cords following the conventional path decreases from crown to bead.

By observation, the researchers determined that nylon cords would assume the desired formation naturally under the stress of the molding pressure, if they were free to slide across each other without excessive friction. Permanent rubber lubricants were used initially to build an experimental tire, and the desired configuration was achieved. Knowing that rubber fabricators often use traces of stearic acid or zinc stearate to prevent adhesion between pieces of raw rubber and to provide lubrication between rubber and mold, the Du Pont investigators decided to try one of these lubricants for geodesic cord placement.

It is well known that the small amount of lubricant used for such an application dissolves in the rubber during vulcanization, with little or no effect on the final properties of the rubber. Therefore, the researchers decided to apply a sufficiently heavy layer of stearic acid to each ply so that its soapy physical character could provide lubrication between the layers of rough, cord-textured rubber skim stock while they were still in a tacky condition. The tires produced this way were entirely satisfactory. Upon dissection, they revealed no irregularity, discontinuity or weakness at the sites of lubricant application.

Apparently this technique can be used with stearic acid or any other solid or liquid lubricant that will dissolve in rubber during vulcanization. Through its use, rubber technologists can help to produce tires or other rubber goods that require a filament reinforcement in a geodesic pattern which might be difficult to obtain by conventional means.

SPECIAL INDUSTRY REPORT

Materials Control

for the Smaller Rubber Plant

► MANY a rubber company has found itself choked off from further growth just at the moment when sales and orders indicated that it was about to break through and embark on major expansion. The reason: shortage of working capital.

In many of these cases, however, this was equivalent to saying that the patient died because his heart stopped beating. What happened to the working capital in many cases is that it was frittered away through inadequate control of the amount of money spent on raw materials. Growth could have been facilitated through materials control involving seven basic steps: (1) ordering the right materials, according to specification; (2) ordering economically; (3) ordering in reasonable quantities to avoid inventory problems; (4) receiving, inspecting, and storing materials; (5) accounting for the usage of all materials; (6) measuring consumption of materials according to established standards; (7) and following up to determine the reasons for excessive usage.

From this list, it can be quickly seen that a materials control program affects many departments and needs top-level support and direction. In its first phase, it requires integrated planning and organization. The other two phases call for the establishment of procedures and records, and the installation of proper controls.

Although at times it is placed under the purchasing department or the treasurer, materials control ordinarily should be the responsibility of the production manager. He is usually best suited to handle the job because it involves coordinating the activities of a number of departments with which he is quite familiar.

Production Control Comes First

One of the most important parts of your materials control program is to see to it that there is adequate planning of *what* is to be produced, *before* materials are ordered. In many smaller plants a production control department, as such, may not exist. Nevertheless, the function of production control should be carried on, at least to some extent, by someone in authority.

To prevent ruinous overstocking of items on the one hand, or equally serious shortages on the other, a company should develop sales forecasts in some form. These forecasts become the basis on which material purchases are made. Fundamentally, this procedure involves deciding at the outset how long a period it is desirable to use for forecasting purposes. It might be a month, a quarter or a year, depending on the specific line a plant manufactures and how fast conditions are expected to change.

By way of illustration, let us assume a plan to forecast on a quarterly basis. Each product requires a separate sales tabulation which can combine known figures for past performance with estimates of future operations. Essentially what must be known is: actual sales for the corresponding period in other years, actual orders at the beginning of the period, production authorized at the beginning of the period, finished stock on hand at the beginning of the period, shipments during the period, and estimated sales for the period to come.

It may be helpful to use a simple form to keep organized records of such information. By organizing the information along these lines, a manufacturer can often improve planning and scheduling remarkably. Similarly, when scheduling is well in hand, it permits judging with a high degree of accuracy what kind of material will be needed, how much, and when it will be needed. Finally, by establishing suitable lead times—based on how fast material is used, how much can be stored, and how long it takes to get it—low stock positions can be spotted in advance.

To facilitate control over materials further, after the preliminary planning of requirements has been accomplished, it is wise to group materials according to their general nature. For example, groupings might be raw materials, component parts, supplies and work-in-process. By doing this, it is possible to obtain a more precise answer to the question of what material is necessary for production.

The next major problem in materials control is to plan for orderly purchasing of materials. In smaller firms someone in the plant should be given the job of buying materials: (1) in accordance with specifications, (2) in the most economical lot sizes, and (3) at the most favorable prices considering delivery, terms, service and so forth. Normally this will be handled by the purchasing department.

Despite careful planning and periodic reviews of materials needed, most smaller manufacturers will find it advantageous to work with a maximum-minimum stock position. By taking

Making sense out of the stock room tangle—

Modern management procedures are a prerequisite for efficient operations in the small no less than the giant rubber manufacturing concern. Where an outlay for complex computing machines would be prohibitive, materials control can still be rationalized to eliminate many of the headaches in ordering, inspection, storage and consumption. In some cases, a special interdepartmental committee may be necessary.

The editors of RUBBER AGE asked Alfred J. Bohl to distill his experience on this subject during 25 years of management engineering into this special report. Mr. Bohl is noted for his work in the areas of materials handling, production standards, cost estimating and financial controls. He analyzes the various procedures which can provide a reliable inventory reporting system from simple stock sheets to a comprehensive accounting record. Readers may obtain a sample of the record keeping form Mr. Bohl mentions by writing him at Wolf Management Engineering Co., 7 S. Dearborn St., Chicago, Ill.

Continuous control of inventories and consumption must begin with integrated planning by top management, relying on all departments for record keeping and review

into consideration the time required to get delivery on an item, the average usage of the item during that time, and the "cushion" stock necessary, it is not very hard to establish maximum and minimum stock levels. It is somewhat more difficult, however, to determine the most economical order, since that requires calculating the effects of price fluctuations, availability, economies due to large commitments, and the investment of capital involved.

Although there are formulas available for calculating the most economical order, they are seldom used by smaller firms. By and large, such managers are familiar enough with their problems to permit a close estimate of the most economical order size. This is true, for example, when a small rubber company manufactures to customer order (or on contract) a specified number of items to be completed during a given period.

Keeping Complete Records

A materials control system can only be as reliable as the information on which it is based. Therefore, great care should be used in setting up suitable procedures and records. Three guidelines are: (1) Install a reliable reporting system to follow the flow of materials from the raw inventory through the entire manufacturing process—department by department—until it moves into finished inventory. (2) Be sure that someone on the management team (in conjunction with the engineering department, if there is one) determines what the standards are, and also reviews and revises them continually. (3) Properly instruct the accounting department in the recording of materials usage.

When materials are received without benefit of a receiving department, some provision must be made for their inspection, storage and entry in a record book. Where practical, recording of incoming items should be done at the time the materials are sent to the storeroom. If feasible, items should also be identified or tagged to prevent mistakes in usage of material. The sales department frequently has charge of the records for completed products ready to leave the plant. Consequently, finished products are not usually a factor in the materials control program.

Many storerooms use bin tags for groups of items. These tags identify the stock, the date items were received and issued for production, and the balance on hand. Stores record cards, which show balances, are also used where there is no central storeroom or where ease of posting records is preferred.

Developing standards of material usage forms the main part of a materials control program. Unless you know how much material you *should* use, control of how much you *do* use will be ineffective. To set acceptable standards involves engineering: how much material, its properties (specific gravity, weight, quality, dimensions, durability), and other relevant specifications.

When small plants manufacture articles for stock, materials control becomes more complicated. But even here the complexity of the problems can be greatly reduced by using analytical engineering techniques, simplifying styles, types, sizes and so forth, and by standardizing the materials to be used. This phase of an effective materials control program again requires the cooperation of many departments: sales, engineering, purchasing and manufacturing. Consequently, it is often wise to establish a "Materials Standards Committee" to handle not only standardization, but also to review inventories and specifications.

After such a committee has approved an acceptable bill of materials—including substitute materials and standardizing wherever possible—a codification program should be put into action to assign each material a specific code number, letter, or combination of the two. Definite specifications (standards) must be established for materials so that material quality will be maintained constantly. Codification of materials facilitates reordering, requisitioning and accounting, because all the people involved are talking about the same particular materials.

Throughout materials controls work the importance of accounting should be emphasized. In large manufacturing plants, procedures often become complex and involve many forms. However, the typical smaller business, with a limited clerical staff, should stick to a simple system.

To insure accuracy of records, many small rubber manufacturers find it practical to actually count their inventories more often than the normal accounting periods require. These physical inventories are taken by stores personnel and checked against book records. If differences are found, adjustments are made by correcting the "book inventory" to conform to the "physical inventory." Action is then taken to determine the cause of inaccuracies in the book inventory figures.

Establishing Continuous Review

A book or "perpetual" inventory is desirable if records are kept in sufficient detail to present a complete picture of materials. If a firm adopts a perpetual inventory system, it should have a planned program for covering all the items stocked at least once a year. The more important items should be checked more often.

The company should set up a regular review of the manner in which receiving reports, materials issued, and stores or stock room records are classified and posted in accounting records. For example, requisitions are usually sorted by classes of products or by job number, while overhead expense accounts are listed in accordance with the way costs are set up. Under a standard cost accounting plan, unfavorable variances quickly highlight excessive materials usage. In addition, management is currently informed of material price variances where materials are currently being purchased above or below prices predetermined for standard cost purposes. However, such information must be translated into action.

All the planning, procedures and records in the world will do no more than provide the mechanics for doing things and keeping track of certain kinds of information. Material consumption cannot be reduced simply by orderly purchasing procedures, or by knowing that more is being used than should be to produce a given item. Money for materials cannot be saved just by having a foolproof inspection system, or by observing that prices are rising. The "control" part of materials control hinges upon decisions by somebody and instructions to somebody leading to some *practical action*. And if the various persons involved are unwilling or unable to make sound decisions and carry out instructions effectively, the materials control program is foreordained to failure.

Thus, when inventories are getting out of line—without proper explanations for shortages, hedges against price changes or plans for unusual expansion—the head of the firm should quickly start corrective action. By periodically reviewing inventories, material costs and material usage, he can gather the necessary facts for controlling materials more closely. But having first planned, organized and established suitable procedures and records for materials control, he will be able to solve many materials problems by promptly pinpointing specific troubles when they occur.

EDITORIAL

Growing Awareness

► While we intend no continuing series of disheartening and discouraging statements about the world in which we live, the general economy of the nation, and the state of the rubber industry, we observe that many rubber industry figures are becoming increasingly aware of the situation as we see it.

It will be remembered that in the face of the most sanguine estimates for 1960 issued at the turn of the year we addressed an editorial appraisal of the situation ("The Still, Small Voice"—January, 1960) pointing to the fact that there were many disturbing factors in the economy as a whole. In February, we noted that there is now a $4 billion gap in the balance of trade between the United States and the rest of the world. Particularly, we pointed to the fact that the rubber industry was in the process of losing many of its historical export markets. What, we asked, is going on here? More importantly, we asked what is being done about it?

A leading rubber industry economist has now observed that rubber industry employment in the Akron area is dropping, and has been dropping for the past few years. Part of the problem, of course, lies in obsolescent facilities. Another part of the answer lies in growing population in other areas. A third, and a major factor, is this matter of foreign imports. In the field of non-transportation rubber products, German unit costs are 25 to 40 per cent less than in the United States. In footwear, Japan is providing tremendous competition.

The economist stated that for each $1 million increase in rubber product imports, 45 rubber workers lose their jobs, plus another 47 in related industries. For every $1 million increase in footwear imports, 77 rubber workers lose their jobs, plus 41 in related fields.

These are serious matters not only for employees in the rubber industry but for rubber companies and their investors. Rubber is a low profit industry with profits averaging 4 to 5 cents on each dollar. Investment return, in comparison with other industries, is also low.

We continue to raise the question—what is going on here? To date, we have not heard any serious discussion of the problem nor have we heard of any solutions advanced. The only thing that people note is that production workers in the United States receive more for their labors than their foreign counterparts. This, we suggest, is hardly news. It neither aids in the solution of the problem nor does it suggest avenues of approach.

The world moves swiftly. All of us, in all types of industry, must face up to the facts of life. We will either learn to compete or we face an unhappy alternative.

ASTM Committee D-11 Holds Meeting

Active subcommittees meet during February 3 to 5
Spring Meeting held at Hotel Sherman in Chicago

► Committee D-11 on Rubber and Rubberlike Materials of the American Society for Testing Materials held its Spring Meeting on February 3 to 5 at the Sherman Hotel in Chicago, Ill., in conjunction with the 1960 ASTM Committee Week, February 1 to 5. Committee D-11 itself met on the morning of February 5, following subcommittee meetings which were held the two preceding days. The regular D-11 dinner was held on Thursday evening, February 4, and the ASTM cocktail party and dinner was held on Wednesday evening, February 3. Guest speaker at the ASTM dinner was John Nash Ott, who presented a talk on "Time-Lapse Photography."

Simon Collier (Quality Control Consultant), chairman of D-11, presided over the committee meeting. J. J. Allen (Firestone), D-11 secretary, read to the committee the minutes of the D-11 advisory committee meeting, which was held on February 3, prior to the start of the subcommittee meetings. Mr. Allen reported that the chairmen of Subcommittee 14 (Abrasion) and Subcommittee 17 (Hardness, Set and Creep) had agreed to combine their subcommittees to become part of Subcommittee 10 (Physical Testing). William H. King (Acushnet Process), chairman of Subcommittee 17, was named chairman of a section of Subcommittee 10.

Mr. Allen stated that the proceedings of the ISO/TC 45 meeting which was held in New York City on October 26 to 31 was reported to the advisory committee by R. D. Stiehler (Bureau of Standards). The report is subject to D-11 approval via letter ballot.

The D-11 secretary announced several new appointments which were approved by the advisory committee. L. A. Wohler (Firestone) has succeeded H. C. Bimmerman (DuPont) as chairman of Subcommittee 22 on Cellular Rubbers. W. H. Meade (Boston Edison) has become chairman of Subcommittee 9 on Insulated Tapes, replacing C. W. Pickells (Con Edison). Maynard Torrence (DuPont) is the new chairman of Subcommittee 19 on Materials in Liquids, succeeding W. Newland Keen (DuPont). R. G. Seaman (*Rubber World*) takes over from Simon Collier (Quality Control Consultant) as D-11 representative to ASTM Committee E-8 on Nomenclature and Definitions. With the retirement of E. G. Kimmich (Goodyear), H. Tangeman will succeed him as D-11 representative on Subcommittee 8 on Flexure Testing of ASTM Committee E-1 on Methods of Testing. G. H. Barnes (Goodyear) will represent D-11 on Subcommittee 12 on Latex and Emulsion Paints of ASTM Committee D-1 on Paint, Varnish, Lacquer and Related Products. J. R. Panek (Thiokol) will represent D-11 on the recently formed ASTM Committee C-24 on Elastomeric Sealants. J. W. Born replaces R. H. Baumen (Firestone) as D-11 representative of Subcommittee 2 of a joint committee consisting of ASTM Committees D-9 on Electrical Insulating Materials and D-20 on Plastics. Les Cooper (Firestone) has been named the chairman of the nominating committee for the selection of new officers for D-11. Committee D-11 is planning two papers on the effect of nuclear radiation, to be given at its next meeting on June 10 in Atlantic City, N. J.

Reports of the different D-11 subcommittees which met during Committee Week follow:

Subcommittee 5—Insulated Wire and Cable (John T. Blake, Chairman): This subcommittee voted to request that Specifications D-734, 752, 753, 1352, 1520, 1521 and 1523 be advanced to standard. It was also voted that D-1047, 1350 and 1351 remain as tentative specifications. Because Specification D-27 is obsolete and not used, it was voted to recommend that it be dropped. Several changes in the proposed specification for black polyethylene jackets were adopted along with other changes in present specifications. In June, a specification for silicone rubber will be discussed.

Subcommittee 6—Packings (R. F. Anderson, B. F. Goodrich Co., Chairman): J. W. Axelson (Johns-Manville) reported for the task group on rubber rings for asbestos-cement pipe. The proposed specifications were revised as follows: (a) original tensile, oil-resistant grade—from 1500 psi min. to 1400 psi min.; (b) modulus as received, non oil-resistant grade—from 1500 psi min. at 350 per cent to 1400 psi min. at 350 per cent; (c) weight and volume increase in water oil-resistant grade from 10 per cent max. to 12 per cent max.; (d) compression set oil-resistant grade, from 20 per cent max. to 22 per cent max.; (e) a minimum cross-section of 0.2 square inches was established for the sample for weight and volume change in water. It was voted to submit the amended proposed specification to letter ballot in D-11.

H. Paul Miller reported on the C-13 meeting in San Francisco in October, 1959. He stated that the recommendations of Subcommittee 6 had been well received and the rubber ring specification had been revised to include the major points of Subcommittee 6's recommendations. The rubber ring specification is being issued as a part of C-443-59T.

The review of tentative methods under this subcommittee's jurisdiction resulted in the committee voting to ad-

vance D-1081-58T, "Evaluating Pressure Sealing Properties of Rubber and Rubberlike Materials" to standard. M. H. Kapps (F. D. Farnam) reported on the activities of Section 10 of Tech A. The chairman then read a letter from Mr. Chatten (New York Naval Shipyard) pointing out the need for test methods to determine the suitability of elastomer materials exposed to liquids and gases under high temperature service conditions. Specifically, the immediate concern is for O-rings exposed to jet fuels at temperatures of 300° to 500°F. Subcommittee 6 will explore the industry's need for the development of suitable test methods.

A discussion was held regarding comments on the ISO/TC-45 Document 497 "Draft Proposal for Natural Rubber Rings for Joints in Water Piping." Comments will be prepared by the Rubber Ring Task Group.

Subcommittee 8—Nomenclature and Definitions (R. G. Seaman, Rubber World, Chairman): The five negative votes on Commitee D-11's letter ballot on revised definitions for "rubberlike, rubber, and rubber products" were considered by the subcommittee and, although some of the objections were resolved, others could not be. By unanimous vote it was decided to refer the definitions back to Task Group 1 for further work.

Task Group 1 was instructed to develop a test program among several laboratories and obtain extension-retraction data on rubber and rubberlike materials for comparison with the specifications outlined in items 2A and 2B of the August, 1959, letter ballot; the specifications suggested by the Polymer Corp., Ltd., in June, 1959; and the specifications suggested in December, 1959, by B. S. Garvey, Jr. (Pennsalt Chemicals). From these data, a quantitative definition for rubber based on laboratory data will be developed for further consideration at the June meeting.

If time permits, work on the revision of the definitions for rubberlike and rubber products will also be attempted. The activities of Task Group 2 on the further development of ASTM D-1418-58T "Tentative Recommended Practice for Nomenclature for Synthetic Elastomers and Latices" is dependent on resolving the conflict of D-1418 with D-1600-58T, "Tentative Abbreviations of Terms Relating to Plastics," the latter of which is under the jurisdiction of Committee D-20 on Plastics.

A meeting consisting of the officers of Committees D-11 and D-20, subcommittee chairmen and others concerned, will be held at ASTM headquarters in April to consider certain areas of conflict between D-11 and D-20 including these nomenclature methods. If and when the conflict is resolved between D-1418 and D-1600, Task Group 2 will continue its work on developing definitions and abbreviations for the other families of elastomers in D-1418, starting with the polymethylene or "M" family.

R. D. Stiehler (National Bureau of Standards), chairman of Task Group 2 had suggested in a letter in August, 1959, that the glass transition temperature might be an effective means of separating rubber and rubberlike materials from plastics. Dr. Stiehler submitted tentative definitions for plastics, rubbers, and rubberlike materials based on glass transition temperatures. These suggestions were to have been discussed at the March 1 meeting between representatives of D-11 and D-20, and, if they are considered acceptable to both committees, work will be started in Subcommittee 8 to incorporate them into the definitions for rubber, rubberlike, etc.

Subcommittee 9—Insulating Tape (W. H. Meade, Boston Edison Co., Chairman): A proposed specification for water-resisting rubber insulating tape was brought up for consideration. A number of controversial points developed and it was decided to appoint a specification section to work out satisfactory solutions. The next item of business was to discuss Specification D-69. Some difficulty has been experienced by one large user of friction tape during cold weather. Considerable discussion took place over the desirability of including certain tests at low temperatures. This item was also referred to the specification section for further consideration. There has been some indication that additional specifications for rubberlike insulating tapes should be developed to match cable insulations already specified by Subcommittee 5. It was the consensus that more thought and further discussion should be given to this matter.

Subcommittee 10—Physical Testing of Rubber Products (L. V. Cooper, Firestone Tire & Rubber Co., Chairman): The chairman announced that the advisory committee had decided to transfer the work of Subcommittee 17 to this group as a task group under Mr. King (Acushnet). Also the work on tear would be considered under the jurisdiction of the subcommittee. The group was also advised that the testing of O-rings had been transferred to Subcommittee 6 on Packings.

After some discussion as to the need for a method for making stress-strain determinations at elevated temperatures, the chairman appointed the following to make a tentative writeup: Bill Rodgers (DuPont), chairman; Al Vieth (B. F. Goodrich); J. I. Black (Shell Chemical); T. D. Bolt (Godfrey L. Cabot), and D. W. Yockum (Sharples Chemical). In regard to a writeup of a method for the use of strain gauge machines for stress-strain testing, the chairman appointed the following task group: Frank Roth (Bureau of Standards), chairman subject to Bureau approval; Rolla Taylor (Scott Testers), and G. E. Decker (Monsanto Chemical).

A request from Tech A for a means to assign definite values to tear values in D-735 was not too enthusiastically received by the group. W. E. Scovill, Jr., (Boston Woven Hose) and a representative of Goodrich Research Laboratories were asked to survey the field and bring in a recommendation as to the action the subcommittee should take.

Subcommittee 11—Chemical Analysis of Rubber Products (W. P. Tyler, B. F. Goodrich Co., Chairman): A proposed revision of D-297 incorporating D-833 within it, was presented and discussed. After discussion of the proposal, decisions were made concerning several items in the proposed revision. The subcommittee voted to recommend the revision for letter ballot in D-11 and for inclusion in the annual report, if possible, subject to subcommittee letter ballot on the final draft of the proposal.

A method for determination of solubility of rubber chemicals has been presented by a task group and approved by subcommittee letter ballot with no negative votes. It was voted to recommend the method for D-11 letter ballot and for inclusion in the annual report.

Results of a testing program on determinations of IIR, titanium dioxide and bound styrene in rubber products were reported. The IIR determination results indicated rather poor reproducibility and accuracy. The titanium dioxide determination results were satisfactory but not excellent and the method for bound styrene determination could not be made to give any meaningful results. The IIR (butyl rubber) and titanium dioxide methods will be incorporated in D-297 with the proper warnings as to reproducibility and accuracy, and further method testing will be started.

Problems concerning activities of Subcommittee 12 which is assuming responsibility for analysis of crude natural rubber, and concerning action of both Subcommittees 11 and 12 with respect to ISO/TC-45 analysis proposals were discussed. Proper liaison arrangements are being made to prevent improper procedure on these matters.

Subcommittee 12—Crude Natural Rubber (L. G. Mason, B. F. Goodrich Co., Chairman): R. D. Stiehler (National Bureau of Standards) and chairman of the United States delegation to ISO/TC-45, reported that the Firestone Plantations Co. has agreed to prepare uniform lots of seven commercial grades which they produce which will have rates of cure ranging from extremely slow to extremely fast. This will give a total of eight lots with the

NBS standard sample 385 of different cure characteristics for the ISO/TC-45 interlaboratory test involving a maximum of 25 laboratories in Europe, the Far East and the United States. In addition, a standard sample of butyl rubber will be included for checking Mooney viscometers and a sample of compounded NBS standard sample 385 for checking cure characteristics of the viscometers.

The Bureau of Standards will distribute these materials including sufficient NBS standard materials for the compounding of the rubber in the United States and Europe through H. C. Baker (BRPRA) and in the Far East through J. E. Morris (RRI of Malaya). The following companies in the United States were to be included in this program:

B. F. Goodrich Research Center, Brecksville, Ohio—A. E. Juve; Goodyear Tire & Rubber, Akron, Ohio—R. B. Knill; U. S. Rubber, Detroit, Mich.—N. P. Bekema; Firestone Tire & Rubber, Akron, Ohio— R. J. Jones; National Bureau of Standards, Washington, D. C.—R. D. Stiehler, and Witco Chemical, Akron, Ohio—J. H. Gifford. It is hoped that this work will be completed in time for the meeting of ISO/TC-45 in Milan, Italy, in 1961.

Dr. Stiehler also reported that several lots of fresh import smoked sheets for GSA had been found to be high in iron and above the 0.0010 per cent max. on manganese, and that one lot was above the RMA specification of 0.0008 per cent max. on copper.

D. D. Wright (Goodrich Footwear and Flooring) reported receiving a lot of No. 1X thin brown rubber containing 0.0037 per cent copper which showed a bad heat condition with numerous tacky melted heat spots. It appears that consumers should be running more copper and manganese tests and probably iron also on shipments of natural rubber. All off-specification lots should be reported and samples sent to the RRIM and to the producer so that proper corrective measures can be taken.

H. C. Bugbee, president of the Natural Rubber Bureau, was unable to attend the meeting, but advised by telephone that Ralph Wolf, formerly manager of compounding research, Columbia-Southern, had joined its executive staff as director of technical service effective February 1, 1960. The new Technical Service Department will act as a catalyst between the advances developed by the Natural Rubber laboratories and the effective application of these in natural rubber usage in the United States similar to that recently initiated in Great Britain. The committee is glad to see that finally the natural rubber producers are following the synthetic rubber industry in furnishing technical service on the use of their products.

After considerable discussion of D-1278-58T, it was felt that it should remain on tentative status until the task group has had an opportunity to complete its work establishing the reproducibility of the various procedures in the present round-robin on the NBS standard sample 385. It is also desirable to wait until the present ISO/TC-45 similar test procedures have been reviewed and compared with those in D-1278-58T.

Left to right: J. J. Allen (Firestone), secretary of ASTM Committee D-11, and Simon Collier (Quality Control Consultant), chairman of D-11, go over subcommittee reports prior to the D-11 meeting on February 5.

The task group will also strive to definitely establish the suitability of the nitrogen and acetone extract procedures now in D-297 which is in the process of revision for use on crude natural rubber. The copper, manganese and iron procedures in D-1278 should also be tried out on a sample of high manganese, copper and iron content rubber since the present NBS 385 sample is extremely low in these impurities.

The possibility of developing X-ray emission spectroscopy (X-ray fluorescence) as a rapid, accurate method for determining copper and manganese in rubber will be investigated. Those interested in testing the samples of special natural rubber referred to by Dr. J. LeBras in the November 9 meeting in Washington, D. C., should advise the chairman. The rubber has not been received.

Subcommittee 13—Synthetic Elastomers (B. S. Garvey, Jr., Pennsalt Chemicals Corp., Chairman): L. Mason of Section 1 task group on sampling, reported on the results of a survey among producers of black masterbatch. J. Black (Shell) suggested a method which may have accuracy of $\pm$ 1 per cent and this will be considered by the section. It was agreed that D-1485-57T will continue as a tentative method until a method of sampling and testing for volatile matter or moisture is resolved.

E. O'Connor of Section 2 task group on chemical tests, reported on Subcommittee 13's letter ballot on method for estimation of per cent of oil in oil and oil black materbatches. Motion was passed over three negative votes to refer the method back to the task group for clarification of wording and further cross checks if necessary. APHA methods for determination of color of rubbers will be submitted by Mr. Black. Mr. Connor will distribute samples to producing plants for cross check.

Section 3 task group on physical tests explained the inconsistency now in Table II of D-1419 whereby the oil is designated as parts per hundred of rubber (pHR) while black is designated as per cent of total rubber, black and oil. Motion was passed unanimously to revise D-1419 so that black will be designated in parts per hundred of rubber (pHR).

Motion was passed to confirm assignment of the following numbers by letter ballot in Committee D-11: 1509, 1606, 1806, 1807. William Orr reviewed the results of the letter ballot in Subcommittee 13 on cross check in producer laboratories on forty parts HAF black per hundred rubber recipe as submitted at the June, 1959, Subcommittee 13 meeting. This recipe was found unsuitable. Therefore, three laboratories are obtaining results on fifty parts HAF per hundred rubber formulae with varying NBTS ratios before submitting formulae for cross check tests of SBR 1500, 1502, 1712 and 1713. Phillips agreed to blend each of these rubbers so that four uniform rubbers can be sent to the participating laboratories in March.

Dr. Garvey reported the results of extensive studies of the task group on

classification and description of extender or process oils. Motion was passed to submit a letter ballot to this subcommittee to add the following as an appendix for information in the use of D-1419:

Description of extender oils in synthetic rubber oil or oil black masterbatches described in D-1419. (a) In Table II, the various oils used in oil materbatches are described as paraffinic napthenic, aromatic, and highly aromatic. The descriptions of these types of extender oils are satisfactory for the purpose of Table II, but are not adequate as purchase specification for these oils. (b) For any oil to be classified as an extender oil for use in SBR oil masterbatches, it must be shown to given masterbatches which are satisfactory both to the producers and consumers of such oil masterbatches. (c) Oils which have been demonstrated to be satisfactory extender oils may be further classified as to chemical types according to Table III.

Motion was passed to recommend to Committee D-11 that D-1417-57T be made a standard method. Motion was also passed to transfer jurisdiction of D-1418-58T on nomenclature of rubbers to Subcommittee 8.

Subcommittee 15—Life Tests for Rubber Products (G. C. Maassen, R. T. Vanderbilt Co., Chairman): M. Schock, chairman of the task group on correlation of oven and shelf aging, reported that results of the 12-year shelf aging tests are now complete. It was asked that Committee D-11 statistically evaluate the data accumulated by this task group.

A. E. Hicks, chairman of the task group on staining tendencies of carbon black, reported that the first problem was development of a method for measurement of the color of a rubber product. Samples of white sidewall were exposed to heat and light and color was then measured by a reflectance instrument. Further work is to be done to determine minimum significant color differences, and to compare results obtained on various instruments and by visual observation.

R. J. Alport, representing J. G. Norton, chairman of the task group on weathering, reported that the fading on the plastic color chip used to calibrate intensity of light source progressed in a straight line function. Committee D-20 is also interested in this plastic chip method and will probably letter ballot after the March meeting. Currently, there is no standard source of supply of chips. It is hoped that the Bureau of Standards will prepare chips when the method is adopted as standard.

A. G. Vieth, chairman of the task group on ozone testing, reported that several suggestions had been made on the letter ballot for revision of D-1149. As a result of these suggestions a new tentative method of test for accelerated ozone cracking of vulcanized rubber was drawn up by the task group incorporating the method proposed by SAE-ASTM Tech A. It was voted and passed that this tentative method be submitted to letter ballot in D-11 to replace the present D-1149. It will be necessary to contact Tech A to resolve any possible conflict.

G. N. Vacca, chairman of the task group on oven aging, reported that results of tests conducted in the Royen Tube Oven developed by Apex Tire appear to be the most promising solution to oven aging uniformity. Since most of the data have been obtained from one set of ovens, it is necessary to correlate results from several others to determine uniformity. Six companies have agreed to participate in a round-robin test program. Results should be available at the June meeting.

William T. Hall

Promoted by C. P. Hall

► C. P. Hall Co., Akron, Ohio, has announced the appointment of William T. Hall as vice-president in charge of sales. Mr. Hall, a graduate of Akron University in 1946, was formerly sales manager. He is a member of the Rubber Division of the American Chemical Society and Rotary International. The company has also appointed Gherald D. Scott, Jr., to the post of secretary-treasurer, Mr. Scott, who has been assistant treasurer of the company since 1957, is a graduate of Babson Institute of Business Administration. He also holds an associate degree in mechanical engineering from Worcester Junior College.

Subcommittee 16—Classification and Specifications of Rubber Compounds (J. F. Kerscher, Goodyear Tire & Rubber Co., Chairman): Two topics made up the agenda for this meeting. The primary subject was a discussion centering around the paper "A Practical Method of Classifying All Elastomeric Vulcanizates" by the Messrs. Catton, Edwards and Loring, which was delivered during the International Rubber Conference, Washington, D. C., November 8-13, 1959, and reprinted, slightly revised, in the January, 1960, issue of the ASTM Bulletin. The second item was a brief report on the October, 1959 meeting, Working Group 6 of ISO/TC-45 held in New York City.

In the opening remarks on the paper, the chairman stated that it represented the present day thinking in this country of how classification of rubbery vulcanizates should be undertaken. He further commented that Subcommittee 16, after coping with the problem of how to classify vulcanizates, during which time it considered existing methods and various modifications of such methods, finally joined forces with task group 4-D-3 of the SAE-ASTM Technical Committee on automotive rubber by appointing a representative group (Messrs. Stickles, Garvey, Hill and Kerscher) from the subcommittee to work with this Tech A group.

In the discussion which followed, the question was raised as to how a compound could be specified that would require less severe values than the basic requirements. The chairman felt that this point had not been adequately covered in the paper and that added clarification of this point would be desirable. A second question raised was who would be responsible for filling in the data in the tables. Here 4-D-3 of Tech A would have the prime responsibility, but Subcommittee 16 would continue to have representation on that committee and thereby aid this group. Furthermore, with 4-D-3 wanting this system to be universal, they are desirous of seeking the advice and criticism of all the groups concerned.

Another question raised was why the letter designations in Tables I and II did not run in a consistent manner; e.g., why oven aging runs from low resistance toward heat (A) to high resistance toward heat (H) while oil swell runs from high resistance to swell (S) to low resistance to swell (F) and further how would one differentiate between materials all of high resistance or zero per cent swell in ASTM Oil 3 but that would differ in resistance to other fluids. The first point was answered by saying that the authors originally had them set up as the person raising the question felt the order should be but, that in subsequent revision of the paper, decided to switch them as they now appear. The latter figures point out the difference in swell in other fluids, other than No. 3 oil. Other data could be handled by a separate suffix designation.

Considerable discussion followed regarding how checks could be set up to prevent Tech A from changing values when desired for automotive use that would not necessarily be applicable to other uses such as wire and cable, hose or belts. It was suggested that the classification be spelled out in one

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standard without tables and allow each group to establish a standard containing tables. It was proposed by J. J. Allen that this would defeat the basic purpose of the system, that is to its becoming a universal one, and he appealed to the group to take a positive viewpoint and give it a trial to prove its merits.

From this discussion a motion was made and approved recommending to D-11 that with the circulation of the next letter ballot to the entire membership of D-11 a reprint of the paper on "A Practical Method of Classifying All Elastomeric Vulcanizates" mentioned previously be included along with a questionnaire. This questionnaire will seek the support from every producer of flexible rubber products (exclusive of hard rubber and sponge) of the system, any criticism or suggestions they have to offer, and particularly to say if they could utilize this system as proposed.

In the brief report of Working Group 6's most recent activity, it was brought out that Mr. Catton presented his paper as Subcommittee 16 suggested. The paper had a definite influence at this meeting so much so that the ISO group decided to defer action on two documents. (Nos. 445 and 446) until the member countries had an opportunity to study in detail the paper and determine whether certain phases of the paper could be embodied into their ideas of how to classify rubber products.

Subcommittee 17—Tests of Hardness, Set and Creep (W. H. King, Acushnet Process Co., Chairman): The committee voted to advance the following two tentative standard test procedures to full standard: D-1390-56T—Test for stress relaxation of vulcanized rubber in compression and D-1415 56T—Test for international standard hardness of vulcanized natural and synthetic rubbers.

R. Shearer reported on the work of his committee on comparing molded versus cut compression set specimens. He reported dimensional variations in the molded specimens, but it was the consensus of the committee that diameter variations would not affect the results under D395-55 Method B; results would be affected under Method A. Thickness variations could be handled by using spacer bars to give proper deflection. Mr. Shearer will prepare a report for possible publication purposes as well as for balloting by Commiteee D-11. This should be accomplished by the June meeting.

Bulletin R-16 describing a Shore Durocalibrator designed for use in testing and calibrating Shore Durometers was received from the Shore Instrument and Manufacturing Co., Inc. This bulletin was circulated for informational purposes.

Subcommittee 20—Adhesion Tests (H. H. Irvin, Borg-Warner Corp., Chairman): Minor differences between ASTM D429-58T and its ISO counterpart will be studied further before making recommendations to D-11 after the next meeting. Three new adhesive tests were discussed. Two of these, introtroduced at the recent ISO meeting will be distributed to Subcommittee 20 membership for continuing discussion at the June meeting. The third, published by Mr. Painter (Lord Mfg.) will be explored further for possible relationship to D-429 by P. Ransen of the same company.

A proposed supplement to include measurement of standardized environmental effects on adhesion values was introduced. Copies of the proposal were distributed so that comment might be forthcoming before the June session. Comments are to be sent to P. Ransen so that the discussion in June might soon be followed by a letter ballot on the subject.

Henry Peters (Bell Telephone Laboratories) was appointed chairman of a task force to review the need for and possibilities of evolving a wire adhesion test. He was to add people to this group as required. The subject of evolving a dynamic test for adhesion of the metal-to-metal variety was brought up following reports of still no further advances in the art relative to non-destructive and dynamic adhesion testing of rubber-to-metal bonds. This will be discussed further.

A representative from the Bureau of Ships will be asked to appear at the next session to discuss recommended changes in D-429 emanating from report 5611-3 (New York Material Laboratory). Scopes, functions and overlaps of the same relative to Subcommittees 20 and 21 will be further reviewed on an intra and inter basis by subcommittee officers.

Subcommittee 21—Testing of Rubber Cements and Related Products (J. F. Anderson, B. F. Goodrich Co., Chairman): Task Group 2B on wire cord (and bead wire) adhesion: R. H. Hertzag, chairman, showed the correlation between wide pull-out tests conducted at Firestone Tire & Rubber, General Tire & Rubber, and Goodyear Tire & Rubber, using Goodyear mold

J. R. Frazier

J. R. Kelly

Promoted by Goodyear Chemical

► Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio, has appointed J. R. Kelly as manager of the Detroit district and J. R. Frazier to succeed Mr. Kelly as field representative in the Cleveland district. Mr. Kelly has been with Goodyear since 1957 as a field representative for the chemical division. Previously he had been associated with the Vernay Laboratories, Yellow Springs, Ohio. A graduate of Antioch College with a B.S. degree in chemistry, he is a member of the American Chemical society and the Dayton and Buffalo Rubber Groups. Mr. Frazier joined Goodyear's squadron training program in 1951 and the following year was assigned to the Inter-Plant Relations Department. He joined the Chemical Division's Operating Department in 1955. Mr. Frazier was graduated from Miami (Ohio) University with a B.S. degree and is a member of the Akron Rubber Group.

with Goodyear rubber stock and Firestone mold with Firestone stock. Results were significant and suggested that further checking should be made.

The next series of tests will be conducted by Firestone, Goodyear, General Tire and National Standard Co., using Goodyear rubber and both Goodyear and National Standard molds. Tests will be conducted at 2″ and 6″ per minute, since these speeds represent maximum influence of speed on test results. Also being considered by the wire group is the application of the "H" test. Koppers Co., U. S. Rubber, General Tire, Goodyear and possibly others will participate in a comparison test program.

Task Group 2A met next. The proposed method for "H" test, textile cord to rubber, prepared by chairman G. H. Harrison, was reviewed and revised for presentation to the subcommittee for approval. This is the first attempt to write a formal method for the "H" test. R. Monet presented considerable data and charts showing the significance of time lag on temperatures of testing. This will be studied further.

Subcommittee 22—Cellular Rubber (L. A. Wohler, Firestone Tire & Rubber Co., Chairman): The minutes covering the changes in nomenclature made at the Atlantic City meeting in June, 1959, were read and discussed. Mr. Bimmerman reported that these changes in D-1055, D-1056, D-1564 and D-1565 had been approved by letter ballot and will be printed in the 1960 D-11 standards available about March 15.

It was reported that SAE Tech A had also approved the above revisions with the exception of D-1564, urethane foam, which will not be printed in the SAE handbook at this time pending clarification of the two-point method for defining urethane foam for seating applications. It was also reported that at the last TCAR meeting, Mr. Shaw (Rock Island Arsenal) noted that their group had accepted the suggestion of ASTM and Tech A committees and were rewriting the proposed Military Standard for cellular elastomeric materials using the new ASTM nomenclature. Their group is still anxious to eventually write one specification for cellular elastomeric materials based on properties rather than type of material.

Objections to D-20 flammability test (D-1692) which resulted from a request for comments in the letter ballot were read and discussed. It was voted unanimously that Subcommittee 22 of D-11 go on record that D-1692 is not a suitable test for all flexible foam and that the title and scope be changed so that rigid foams only would be covered by the specification.

Mr. Bimmerman proposed setting a task group in Subcommittee 22 to review current activity in the field of flammability testing. A group headed by Mr. Barnes and including Mr. Collier and Mr. Svendsen took this assignment and will report at the June meeting.

The SPI Committee on Flexible Vinyl Foam has asked that the D-1692 flammability test be included in the D-1565 specification. This request will be circulated through Subcommittee 22 and action will be taken at the June meeting. The committee was in general agreement for including this flammability test since, with vinyl foam, a different class of material that has inherently high basic flame resistance is being dealt with.

Subcommittee 23—Hard Rubber (W. J. Dermody, Electric Storage Battery Co., Chairman): During this meeting, comments on letter ballots concerning D-530 and D-639 were reviewed. It was agreed that it was not the intent of Subcommittee 23 to exclude constant rate of strain testing machines from use in tensile testing of hard rubber. It was moved that this committee request D-11 authorization for an editorial change in the wording of the current D-530 revision to include all machines meeting the standards of accuracy of the Society. Henry Peters of Task Group 4 presented a system of hard rubber grades for discussion. It was decided to include a heading for each method of test specified in D-530 and to broaden the range of values covered and simultaneously narrow the limits of each group.

Subcommittee 24—Rubber and Rubberlike Coated Fabrics (K. L. Keene, U. S. Rubber Co., Chairman): W. H. Bryan, chairman of Subcommittee 25's task group on cold crack resistance reported work was in progress on the correlation of six different methods of conducting cold crack tests on five different types of coated fabrics. Test data will be reported on at the June meeting. Dynamic test methods for cold crack resistance were discussed.

K. L. Winkley reported by letter that bottled gas at a given BTV content gave flame resistance test results very similar to those obtained by the various laboratories which used gas furnished for domestic consumption. The cost of bottled gas is approximately $110.00 per installation and apparently is not justified. However, further investigation will be made and reported on at the June meeting. Mr. Winkley's letter will be circulated to members of this subcommittee.

No report was received from Mr. Cooper, chairman of Subcommittee 10, on Subcommittee 24's request for inclusion of tension testing machines other than pendulum type of testing tensile and tear. Approval was given to the chairman to inform the General Services Administration that this subcommittee had no objections to the cancellation of Federal Specification CCC-C-418, cloth coated upholstery (vinyl resin).

Dr. Stiehler reported that Mr. Collier's request for work on gas permeability of rubber products had been referred to Subcommittee 10. Dr. Royen's paper on a modified oven for testing volatility loss of vinyl coated fabrics was brought to the attention of this subcommittee as a possible new test method. However, no work was authorized for the present time.

Returns on a letter ballot from members of Subcommittee 24 on the inclusion of a new test method to be called tack tear was as follows: affirmative 10; negative 0; not voting 4. The chairman was authorized to submit this test method to Committee D-11 for letter ballot. The test method is attached to and becomes a part of this report. It is requested that it be submitted to Committee D-11 letter ballot.

Returns from a questionnaire requesting information on the advisability of setting up a separate task group for test methods to be used by the automotive industry for testing coated fabrics were as follows: A task group should be set up—affirmative 6; negative 0; not voting 8. Will participate—affirmative 4; negative 4; not voting 6. Will accept work assignments—affirmative 3; negative 4; not voting 7. Believe quarterly meetings should be held—affirmative 6; negative 0; not voting 8. In view of the very limited work assignment acceptances it was decided to table the suggestions until more interest was shown.

TMI slip tester for testing resistance of a coated fabric to slip was discussed but there was not enough general interest to justify work. D. D. Wright reported that Committee D-13 was to letter ballot their committee for permission to change the mm. content of fabric used for rubber coating from .0005 per cent to .0015 per cent. Also the test method is being clarified. The proposal will be circulated to members of this subcommittee for their information.

Subcommittee 25—Low Temperature Tests for Rubber and Rubberlike Materials (R. S. Havenhill, St. Joseph Lead Co., Chairman): ISO/TC-45 Meeting: R. E. Ofner, in summarizing the work of the low temperature group, stated that Document 389 on brittleness was voted, with minor change, to be advanced to a draft ISO recommendation. Regarding Document 387 on stiffness, further work with gaseous and liquid media was recommended.

Ball Thrust Velocity Method: Prints, prepared by R. G. Dunlop, showing details of the ball thrust method for velocity determination of the Scott Solenoid were circulated.

Gravity Operated D-746: Round-robin data showing good agreement of Solenoid and gravity actuated brittleness equipment were circulated. The chairman was then authorized to submit this data to D-20 and request modification of D-746 to include gravity actuation.

Low Temperature Coated Fabrics

Test: Chairman W. H. Bryan reported that a round-robin involving six types of test on five coated fabrics was set up as an initial phase in the development of a standard cold crack test.

Advancement to Standard: It was voted to recommend the following three methods for advancement to standard—D-1053-58T—modified as follows: insert (Black) after .125 under 2C Torsion Wires. Also insert word (White) after 2.000. This editorial change merely designates the color coding of the wires; D-1329-58T—TR Test; D-1349-58T—Conditioning Temperature. It was recommended that D-736 be left as tentative as it is an inaccurate method which is rapidly being replaced by D-746.

Subcommittee 26 — Processability Tests (Rolla H. Taylor, Scott Testers, Inc., Chairman). The task group responsible for the revision of D-927 and D-1077 and the combination into a single method (D-1646) was released with thanks for a job well done. A verbal report, in absentia, from the task group on shrinkage indicated that definite recommendations could be expected at the June meeting. J. Kerscher, chairman of the task group on extrusion dies, reported that ten companies have obtained the revised Garvey die and that tests are underway to determine its suitability as an extrusion test die. The committee agreed that this die should be referred to as the extrusion die No. 1 (Garvey type).

Other items of business discussed were ISO action of concern to the committee; the new curometer type instrument being produced in Europe; current modications in the model NBS Mooney viscometer by the manufacturer; and the effects of varying pressure on the Mooney value of high molecular polymers when tested in the new model ST1 Mooney viscometer. No action was taken on these items at this time, but it was indicated that more experience may warrant investigation of the curometer and of the effect of holding pressure on the Mooney value. No committee D-11 action is required at this time.

Subcommittee 27—Tests of Resilience (W. A. Frye, Inland Mfg. Div., GMC, Chairman): A report was presented on the results of a questionnaire to determine the estimated reproducibility of the Yerzley oscillograph. The questionnaire results, and discussion in the subcommittee, indicated that no work on the method D-445-55 is necessary at this time. A report on a questionnaire about D-623-52T revealed that the Goodrich Flexometer has the widest use, and that stroke and load conditions vary considerably. The group felt that no effort should be made to standardize nominal test conditions at this time.

The projected forced vibration method was discussed. There was no interest in the subcommittee. Mr. Bachelder (Testing Machines) supplied several copies of a description of the Wallace Sinusoidal Dynamic Strain Tester, which was developed by A. R. Payne of the Research Association of British Rubber Manufacturers.

Subcommittee 29—Compounding Ingredients (A. E. Juve, B. F. Goodrich Co., Chairman): John Gifford reported on the results of the work done by his task group to establish a specification for the properties of all the common grades of carbon black used in the rubber industry. The proposed specification includes values and limits for two of the properties of carbon blacks using methods developed in Committee D-24 and values of stress-strain properties of natural rubber vulcanizates containing the carbon blacks prepared in accordance with an interim method based on D-1522. Following a discussion of the proposed specification, it was unanimously agreed in the subcommittee that:

(a) The interim method based on D-1522 would be proposed as a replacement for D-1522 and that a letter ballot of D-11 would be taken on this proposal; (b) The proposed specification with the values and limits suggested by Mr. Gifford's group would likewise be letter balloted by D-11.

The results of the letter ballot in Subcommittees 13 and 29 on the proposed Table XII of the contemplated revision of D-15 were discussed. The chairman of the task group to follow any changes in the properties of the Industry Reference black 1 as the result of aging, reported that checks after 9 and 12 months of black stored both in bags and air-tight cans, showed no measurable changes in properties. This check will be continued at 3-month intervals.

Subcommittee 29 was assigned the task of attempting to develop a test method for determining the degree of dispersion of pigments in rubber. A task group will be set up for this purpose consisting of about equal representatives from carbon black producers and consumers. Although carbon black will be the prime pigment to be considered, other pigments also must be taken into account. The Bureau of Standards announced that a reference lot butyl rubber had been set up with the number 388. It is available in 25 kilo. packages at $45.00 each.

Technical Committee on Automotive Rubber (W. J. Simpson, Chrysler Corp., Chairman): This committee has letter balloted and approved changes in specifications on: Latex Foam D-1055, Cellular Rubber D-1056, Vinyl Foam D-1565 and Automotive Elastomer Compounds D-735. The changes in D-735 involve the addition of low temperature stiffness, reduction of compression set times to 22 hours, and the use of suffix numbers to replace the former subscript numbers.

Items published only by the SAE include a new radial seal nomenclature,

V. K. Hitch

R. B. Silver

H. M. Whitacre

Akron Chemical Reorganizes Staff

► In an executive staff reorganization, Akron Chemical Co., Akron, Ohio, has appointed R. Bruce Silver as vice-president and general manager. Mr. Silver has been active in all phases of the company's business since he joined the firm in 1948. Vernon K. Hitch, associated with the company since 1935, has been named vice-president and sales manager of chemicals and Dr. Harold M. Whitacre has been appointed vice-president and sales manager of compounding materials. Dr. Whitacre joined Akron Chemical in 1939. The company, which celebrated its 30th anniversary in December, 1959, specializes in the sales of raw materials to the rubber and vinyl industries.

changes in the SAE standard on V-belts and pulleys and recommended practice on automotive V-belt drives. Now nearly complete are an automotive air-conditioning hose specification, modifications of ozone testing, a dipped goods and coating specification and a specification on automotive seals.

The publicity section chairman, J. M. Ball, indicated that papers on completed programs will replace the previous progress type publicity report. A paper on the problems and advantages of reducing compression set time from 70 hours to 22 hours as been given by William King. Messrs. N. L. Catton, R. C. Edwards and T. M. Loring have collaborated on a paper, "A Practical Method of Classifying All Elastomeric Vulcanizates." This paper has been presented at the International Rubber Conference, the ISO meeting and Tech A, and is currently being presented to other groups.

ISO/TC-45 American Group Report —R. D. Stiehler, National Bureau of Standards, Chairman): The following methods were approved at the meeting for postal-ballot of the member countries: (1) density of latex; (2) volatile fatty acid number of latex; (3) nitrogen in latex; (4) coagulum in latex; (5) impact brittleness temperature; (6) resistance of vulcanized rubber-to-liquids; (7) adhesion of vulcanized rubber-to-metal (two procedures). In addition, approval was given for a postal ballot on standard atmospheres for conditioning and testing rubber and for amendments to the ISO recommendations on tensile testing and on hardness testing (including a procedure for measuring the hardness of thin specimens).

The working groups of ISO/TC-45 were reorganized and consolidated into the following eleven groups: (A) Chemical tests; (B) Latex tests; (C) Physical tests on unvulcanized rubbers; (D) Physical tests on vulcanized rubbers; (E) Viscoelastic properties; (F) Degradation; (G) Electrical tests and ebonite; (H) Flexible cellular materials; (J) Classification of vulcanized rubbers; (K) Products; (L) Terms and definitions. The United States has been designated convenor of Working Groups C and D. Germany and the United States have been proposed to convene Working Groups K on Products. It was agreed to choose the convenor by postal ballot.

Work was assigned to the appropriate working groups on the preparation of specifications for rubbers and latices both natural and synthetic, foam rubber for hospital mattresses and transport seating, rubber hose, rubber rings for asbestos-cement pipe, rubber flooring, safety boots, ebonite, and antistatic rubber components for hospitals.

The American group for ISO/TC-45 has referred the United States representation on the ISO/TC-45 working groups and the manner of voting on Draft ISO recommendations to the Advisory Subcommittee of Committee D-11. The Advisory Committee proposed the following procedure for voting on Draft ISO recommendations: The appropriate subcommittee chairmen in Committee D-11 will review the Draft ISO recommendation and compare it with existing ASTM standards. If there is substantial agreement between them, the American group for ISO/TC-45 will recommend to ASA that the United States vote affirmatively, basing the vote on the previous vote for the ASTM standard. If there are substantial differences, the subcommittee chairman will prepare a report summarizing the differences including his recommendation will be sent immediately to the ISO version. This report and a letter ballot on the Draft ISO recommendation will be sent immediately to the members of Committee D-11. If there is no comparable ASTM standard, the entire Draft ISO recommendation will be submitted for immediate letter ballot in Committee D-11. In view of the reorganization of the working groups in ISO/TC-45, it is planned to reconstitute the membership of the American group for ISO/TC-45.

Ken Ferguson

Appointed by Eastman Machine

► Ken Ferguson and the Campbell Sewing Machine Co. have been appointed representatives for the Eastman Machine Co., Buffalo, N. Y. They will divide the northwestern sales territory formerly handled by J. B. Haffen & Co., with which firm both were previously associated. Mr. Ferguson will cover the northern part of California and the state of Utah, while Campbell Sewing will have Washington and Oregon. Both have been selling Eastman machines for the past 15 years in the territories for which they are now direct Eastman representatives. Mr. Ferguson has taken over the Haffen quarters at 682 Mission St., San Francisco, Calif., while Campbell will remain at 2314 Fourth Ave., Seattle, Wash.

NCRG Hears Talk On Food Additives Amendment

► "The Scope of the Food Additives Amendment" was the subject of a talk given by McKay McKinnon, Jr., San Francisco District Director of the Food and Drug Administration, at the February 11 meeting of the Northern California Rubber Group, which was held at the Elks Club in Berkeley, Calif. According to Mr. McKinnon, misconceptions and misapprehensions concerning the amendment have come to light. He pointed out that the law concerns itself with plastics, adhesives, tapes and inks when they are used in direct contact with food. Hence, the law does apply to packaging materials and someone, either the raw material producer, the package manufacturer or the package user, determines just where the food product stands with respect to legal marketability in that particular package, he said.

Mr. McKinnon distributed a tentative outline of information useful in determining the status of materials contacting food under the Food Additives Amendment. The outline presented a minimum of data essential for determining possible migration to food. Mr. McKinnon stressed that the administration cannot answer a general question as to whether any substance is an acceptable component of food packaging material unless it is provided with, at the same time, information as to how much, if any, of the material migrates to what specified food. He assured the group that the Food and Drug Administration will help where it can to bring about orderly and effective general compliance with this most recent addition to the Food, Drug and Cosmetic Act.

"Bunco" was the subject of a talk presented by Inspector Logan L. Page of the Oakland (Calif.) Police Department, before the Northern California Rubber Group on January 14 at the Elk's Club in Berkeley, Calif. Inspector Page described several of his experiences in combatting confidence men, and advised the group on how not to get taken in by bunco artists.

Granite State Expands Facilities

► Granite State Rubber Co., Concord, N. H., has completed an expansion program which includes new packing and shipping departments and installation of manufacturing equipment. The company's East Milan Road plant is nearly doubled by the addition and brings the total manufacturing space of Granite State's two plants to nearly 100,000 square feet. According to the company, increasing demand for its products lies behind the expansion, and production has been boosted to nearly twice the capacity for which the original plant was designed.

A Progress Report:

Food Additives Amendment Passes Into Law

On March 6, 1960 the 1958 Food Additives Amendment to the Federal Food, Drug and Cosmetics Act took effect. The 1958 Amendment regulates substances affecting the characteristics of food or entering into foods whether directly, as intentional additives, or indirectly, as incidental additives which transfer or migrate to the food in the course of its processing, packaging or storage. The Amendment has been interpreted to include many rubber products as well as the compounding ingredients which have gone into their manufacture. Thus, many rubber goods manufacturers find themselves directly involved with the new Amendment and its many ramifications. The following report should serve to clarify the situation and serve as a progress report on the Amendment and the rubber industry's reaction to it.

► Public Law 85-929, 85th Congress, covers a substance which when used as intended may result, or be reasonably expected to result, in its becoming a component of food, or otherwise affect the characteristics of a food, *and* which is not generally recognized among qualified experts as having been shown to be safe.

Thus included are substances intended for use in producing, manufacturing, packaging, processing, preparing, treating, transporting, or holding food; and specifically included are any sources of radiation intended for such use. Antioxidants, mold inhibitors, rancidity prevention agents and other preservatives, emulsifiers, stabilizers, extenders, colors, flavors, bleaching agents and thickening agents are examples of the type of additives which are covered.

Under the new law the manufacturer or promotor of a new food additive will have to determine the safety of such a product and submit the results of tests to the Food and Drug Administration. If FDA is satisfied that the data establishes safety of the additive under proper conditions of use, it will issue a regulation specifying the amount which may be used, the foods in which it may be used, and any other necessary conditions of use. If safety of the additive is not established in the opinion of FDA, its use will not be permitted. Procedures have also been established so that an adverse ruling may be appealed.

Recognizing the implications of the new law to the rubber industry, the Rubber Manufacturers Association, Inc., formed a special committee to investigate the matter. Committee members contacted pertinent personnel of the FDA in order to determine what products would be affected and what the responsibilities were to FDA. Many rubber industry representatives (including a RUBBER AGE reporter) attended a conference held in Washington, D. C., on November 24 and 25, 1958, cosponsored by the Food and Drug Administration and the Food Law Institute, Inc., of New York. A conference held in Washington on November 16 and 17, 1959, was also attended by an RMA representative in order to obtain further clarification.

On November 20, 1959, following a period of no definitive action, there was published in the *Federal Register* a listing of substances that are generally recognized as safe. These substances, e.g., ascorbic acid, are generally incorporated into the foods. Many in the industry observed that publication of this so-called "white list" did not materially aid in an understanding or interpretation of the new law.

FDA Official Speaks

At a meeting of the Manufacturing Chemists' Association held in Washington, D. C., on December 7, 1959, Einert Wulfsberg, FDA official responsible for administering the new law, indicated that tests would be required on all rubber products being sold to the food industry that were not generally recognized as safe. In Mr. Wulfsberg's opinion, the rubber manufacturer must, as of March 6, submit the formulation of such rubber compound used in contact with foods to FDA for certification. The formulation must be accompanied by the results of a qualified testing organization and these test results must indicate to the satisfaction of FDA that (1) no substance can be extracted from the rubber compound under test conditions simulating food service, or (2) the substance or substances extracted from the compound under test conditions can be identified and determined to be harmless to the health of man or beast.

On January 8, 1960, rubber industry representatives met with Fred A. Cassidy of FDA. Mr. Cassidy initially referred to the definition of a "food additive" as contained in the statute. In paraphrasing the statutory definition he advised that a substance is a "food additive" if in its use it becomes (1) a component of the food, and (2) such component is not generally recognized as safe. He amplified his remarks by further stating that a substance must meet both of these above criteria to become a "food additive."

With respect to packaging materials, rubber items and similar products used in the food industry, the statute would apply only if there are substances in these products that extract or migrate out of the product and become a component of the food with which they are in contact. Further, if such substances that may extract or migrate are generally recognized as safe they are not "food additives" insofar as the statute is concerned.

In answer to an inquiry put to Mr. Cassidy regarding the "approval" by FDA of products used in the food industry, Mr. Cassidy emphasized that the statute does not require specific approval by FDA of a product used in the food industry. He did comment that manufacturers have sent in letters accompanied by a mass of data to the FDA chief toxicologist who has rendered advisory opinions as to whether the product, or substances used in the product, are generally recognized as safe or unsafe. Obviously, persons who have received these advisory opinions stating that a product, or the ingredients of the product, are recognized as safe, use such replies as approval by FDA of the materials involved.

Many in the rubber industry feel that the Food Additives Amendment does not establish a requirement for manuturers to make application to the FDA and subsequently receive back from FDA either an approval or disapproval of their products or the ingredients used in the manufacture of such products. If such an application-authorization procedure is established by the Amendment, it would be necessary for FDA to employ several thousand people to process the paper work.

Mr. Cassidy was asked: What are the rubber manufacturers' rights and responsibilities under this Amendment? The language of the statute itself prohibits the use in food of additives which have not been adequately tested to establish their safety. The provisions of the statute apply only in circumstances

where a "food additive" is involved and none of its provisions apply where no "food additive" is involved.

The statute defines "food additive" as follows: "The term 'food additive' means any substance the intended use of which results or *may reasonably be expected to result,* directly or *indirectly,* in its becoming a component or otherwise affecting the characteristics of any food, if such substance is not recognized, among experts qualified by scientific training or experience to evaluate its safety, as having been adequately shown through scientific procedures to be safe under the conditions of its intended use."

In the opinion of the representatives in attendance, the rubber manufacturing industry is in the business of manufacturing rubber products, not "food additives." The rubber products used by the food industry are not intended to, or could be reasonably expected to impart a "food additive" to the food with which they come in contact.

The representatives felt that if a rubber manufacturer making a product used in the food industry is certain that nothing in his product will extract or migrate out and become a component of the food, he is completely exempt from the Food Additives Amendment. Moreover, if the rubber products manufacturer knows that a component of his product will extract or migrate out and become a component of the food during its use and further knows that such extract or migrant is generally recognized as safe, he is not included under the provisions of the Food Additives Amendment.

Provisions of Act

Industry members also have noted that there is nothing in the Food Additives Amendment of 1958 to interfere with the production, distribution and sale of rubber products used in the food industry, provided the manufacturers of such products are themselves satisfied that they are complying with the language of the statute. Nothing in the statute requires them to obtain FDA approval of their product, their compound or compounding ingredients.

The statute does establish a procedure entitled "Petition to Establish Safety" which provision is as follows: Any person may, with respect to *any intended use of a food additive,* file with the Secretary a petition proposing the issuance of a regulation prescribing the conditions under which such additive may be safely used.

With respect to rubber products, industry members have ventured the opinion that it is certainly unlikely to have as an *intended* use a "food additive" as defined in the statute; therefore, there is no reason to make a petition. There could possibly be rare situations where some ingredient in a finished rubber product might migrate from the product and become a component of the food with which it is in contact.

It is felt that the conditions required to apply for extension could not be met by the rubber industry without extensive testing, which in some cases might take two years. Many persons in the industry are of the opinion that there is still general confusion concerning the responsibilities of the rubber industry to this Amendment. The RMA committee investigating the ramifications of the new Amendment has now reached the following conclusions:

(1) The rubber manufacturers are not prepared to comply with the Amendment by the deadline date of March 6, 1960.

(2) General confusion still exists as to whether or not rubber products fall within the jurisdiction of the Amendment.

(3) The Food and Drug Administration should offer some guidance and suggestions to the rubber industry.

J. S. Brice

Named District Manager

► J. S. Brice has been named district manager of the southeastern district by the Chemical Division of Goodyear Tire & Rubber Co., Akron, Ohio. Mr. Brice, previously senior sales representative in the southeastern district, is headquartered in Atlanta, Ga. He was graduated from Coe College in 1948 and two years later received an M.S. degree in textile technology from the Institute of Textile Technology. Following experience in technical service and research areas, Mr. Brice joined the Chemical Division of Goodyear in 1955. After a period of training in Akron, he was assigned as a sales representative in the southeastern district. Mr. Brice is a member of the American Chemical Society, the American Association of Textile Chemists and Colorists, the Society of Plastics Engineers and the Southern Rubber Group.

Plan Conference on Polymers

► Plastics Institute, London, England, has scheduled a Conference on Polymeric Progress, to be held on March 30 and 31 at the William Beveridge Hall, Senate House, University of London. The first session of the two day conference will be on the topic of Materials. Papers include: "New Polymers: New Problems," by Professor H. F. Mark (Polytechnic Institute of Brooklyn); "High-Temperature Resistant Materials," by N. J. L. Megson (Ministry of Supply); "Acetal Polymers," by W. Henry Linton (DuPont); "Polyesters of Carbonic Acid," by H. Schnell (Farbenfabriken Bayer); and "Polyolefins," by J. C. Swallow (Imperial Chemical Industries).

The second session, on Methods, will be opened by J. R. Whinfield (Imperial Chemical Industries), whose paper will lay the foundations for the day's proceedings. Papers include: "Newer Methods of Polymerization," by Professor G. Gee (University of Manchester); "Recent Advances in Stereospecific Polymers," by Professor G. Natta (Institute of Industrial Chemistry of the Polytechnic School of Milan); and "The Impact on the Plastics Industry of Developments in Petrochemicals," by H. M. Stanley (Distillers). The papers, together with the discussions, will be published in the June 1960 Issue of the *Transactions and Journal* of the Plastics Institute.

Synthetic Rubber Story on TV

► The first television showing of a new film on the wartime birth and post-war growth of the synthetic rubber industry was presented on February 14, 1960, by TV station WRC-TV in Washington, D. C. The 15-minute film, called "The Atom Shufflers," was produced by the National Association of Manufacturers in cooperation with the Rubber Manufacturers Association. The film will be exhibited by 270 TV stations throughout the country over the next several months as another in NAM's "Industry on Parade" film series. In addition to the United States showings, the film will be projected from 42 overseas TV outlets. NAM reports that in the near future the film will be made available to schools and local service clubs from its regional film depositories.

Coming Next Month

A question and answer "fact sheet" clarifying the applicability of the Food Additives Amendment of 1958 to rubber manufacturers will appear in the April, 1960 issue of RUBBER AGE.

Goodyear Unveils Dynamometer

High-Speed Test Unit Probes Stresses of Aircraft, Racing and Passenger Tires

► The fastest speeds ever attained by a tire were demonstrated to newsmen at the official dedication of a $2 million multi-stage dynamometer system on February 18 at a new Akron, Ohio, facility of Goodyear Tire & Rubber Co. The unique system combines an electronic, remote control system with a bank of high-powered motors to pioneer new types of tires for jet aircraft, as well as to torture-test tires for conventional automobiles and racing cars.

The machine is able to simulate the operational conditions of aircraft taxiing, take-off and landing—even the tremendous impact and yawing and twisting of tires as a plane touches down on a runway. Stresses far in excess of currently anticipated jet speeds can be reproduced, up to 510 m.p.h., thereby avoiding the hazards and great expense of actual flight testing. The unique system will also permit research on experimental natural and synthetic rubber constructions, plastics, glass and metals.

Goodyear's Aviation Products Division developed the system in response to the extreme demands being made on jet plane tires during extended taxi runs or catapult launchings. The machine, separated from the control room by an explosion-proof wall, uses 8600 h.p. motors to duplicate 0 to 24 ft./sec./sec. acceleration and deceleration in 20 seconds, with 80,000 pound loads at 15 degree yaw and camber. Supersonic aircraft exposures from +650° to —100° F. can likewise be approximated.

Auto Tires To Benefit

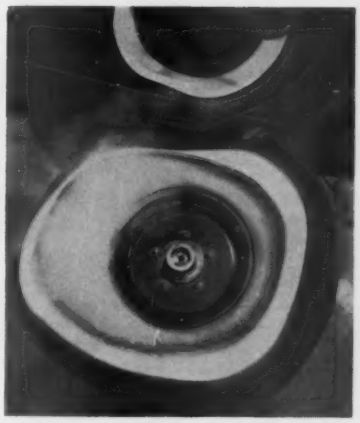
While the primary unit utilizes a giant flywheel, ten feet in diameter, for testing airplane tires at ground speeds up to 320 m.p.h., another "tire-on-tire" test machine can achieve surface speeds in excess of 500 m.p.h. It simulates actual load conditions by pressing two tires together, tread to tread, until the carcass of one literally explodes. The force has driven chunks of tread through the steel roof of the building during preliminary runs.

Such destruction testing of tires for aircraft and racing cars is expected to provide engineers with more exact causes for ultra-high speed failure, in turn leading to improvements in passenger car tires. The Goodyear test track at San Angelo, Texas, has been the site for conventional runs of automobile tires up to 160 m.p.h., but the higher speeds currently anticipated go beyond the capabilities of "highway testing." The dynamometer has accelerated several passenger car tires to 297 m.p.h. under simulated load conditions without failures, many of them successfully withstanding speeds exceeding 300 m.p.h.

Tire sizes from 16 inches to over 6 feet in diameter can be accommodated by the machine which was built by Adamson-United Co. of Akron. The system complete with its two electric motors requires a floor space of 9375 square feet. By programming a test, engineers can send a tire uninterruptedly through each phase of the conditions it would meet in actual operation, at predetermined loads or speeds.

TV Circuit Shows Tests

Because of the physical dangers involved in running tires at such high speeds, the testing is viewed on closed-circuit television which also permits slow-motion filming of results. TV screens, linked to cameras focused on each of four independently operated test carriages, are mounted on two elaborate control panels in a room adjacent to the test chamber.



Extreme stress at test speeds exceeding 300 m.p.h. causes passenger tire (top) literally to come apart, its bead yawing from the wheel, while comparison tire remains intact.

The dynamometer power system is designed so that both ends of the motor shaft can be utilized as drivers. One side drives a flywheel, with a test carriage on each end. The opposite end of the shaft actuates a gear which, in turn, drives two pinions on which tires are mounted.

Specially designed racing tires accelerated on the "tire-on-tire" unit to 510 m.p.h. were recently used by Mickey Thompson of El Monte, Calif., to set a new American land speed record of 332.809 m.p.h.

The remote control and closed circuit television features of Goodyear's new tire testing system in Akron, Ohio, are explained by E. J. Thomas (left), chairman of the board, to RUBBER AGE staff editor Harvey Fireside. Record speeds of 510 m.p.h. are attainable with the 8600 h.p. dynamometer.

Connecticut Rubber Group Meets

Symposium on Polymers for the 60's Features Leading Industry Figures

► "Polymers for the 60's" was the theme of a symposium held by the Connecticut Rubber Group on February 19 at Waverly Inn, Cheshire, Conn. Over 325 members and guests heard the four symposium panelists—Leon Talalay (B. F. Goodrich Sponge Rubber Products), Dr. Herbert A. Winkelmann (Dryden Rubber), Dr. Ray P. Dinsmore (Goodyear Tire & Rubber) and Dr. John T. Blake (Simplex Wire & Cable)—predict a decade of technical advances for the rubber industry.

John H. Fielding (Armstrong Rubber) served as moderator of the panel symposium, substituting for E. R. Bridgwater (DuPont), who was unable to participate due to illness in his family. Prior to the symposium, a lecture on "New Polymers for the Rubber Industry" was given by Prof. Herman F. Mark (Polytechnic Institute of Brooklyn).

The early development of many new types of synthetic rubber, based on polymerization techniques now coming into use, was foreseen by Dr. Mark. He pointed out that we can now polymerize monomers not previously possible. The methods used are based essentially on new types of catalysts and on techniques of anhydrous polymerizations. The lecturer explained that although there is a great deal of interest in synthetic polyisoprene obtained from the isoprene monomer, rubbers from special butadiene stereoisomers and particularly rubbers obtained from olefin copolymers are of great interest for the future. These olefin copolymers are ethylene and propylene, ethylene and butylene, ethylene and acrylonitrile, and ethylene and styrene.

Dr. Mark stated that early work on the polymerization of alpha-olefins showed that the chemical composition and the physical structure of catalysts obtained by mixing titanium tetrachloride and aluminum ethyl depends on the conditions of preparation and the aging of the catalytic mixture. These catalysts differ in their degree of dispersion resulting in different catalytic properties. Those which are finely dispersed polymerize ethylene quite well but are less effective with alpha-olefins giving mainly atactic polymers, while catalysts which are less dispersed polymerize both ethylene and alpha-olefins, the latter to products with a high isotactic content. For copolymerization, it is necessary to prepare catalysts of homogeneous composition and structure.

Cites Reactivity

According to the speaker, another difficulty which one could foresee, is the greater reactivity of the ethylene as compared to alpha-olefins. He went on to explain that the presence of a methyl group, an electron donor, on one hand increases the monomer reactivity in cationic polymerization while decreasing it in the case of anionic catalysts. Dr. Mark informed the group that during the coming decade it can be expected that new ways will be found to use inorganic elements, such as silicone, in the manufacture of synthetic rubber.

The first symposium speaker was Mr. Talalay, who discussed "Cellular Products." He stated that in the past the cellular materials market has been dominated by latex foam rubber, and while it is still the most prominent material in the comfort cushioning field, vinyl and particularly urethane foams of suitable properties have been developed which may well dominate the markets of the future.

Mr. Talalay explained that latex foam hit its peak production in 1955, with a rate of over 50 million cubic feet in that year, but it has been gradually declining since. At about the same time, urethane foams were developed and the urethane foam industry began to rise at a very rapid rate. Vinyl foam has made some progress although at a slower pace.

The panelist also mentioned the production of expanded rubbers, which include both the open cell and the closed cell flexible materials. While the bulk of expanded rubbers are in the form of natural rubber or butadiene-styrene chemically blown sponge, many of the newer elastomers are being made into both open and closed cell sponge for special applications.

In discussing the growth of the rigid cellular materials field, the speaker said that the major product in this market has been expanded polystyrene; however, other materials such as rigid vinyl and rigid urethane foams are beginning to gain prominence. In addition, there are a number of other rigid cellular materials, such as cellulose acetate, phenolic resin and epoxy foams, but as yet their uses are minor.

In the field of flexible foams, the speaker pointed out, there is a fair amount of neoprene latex foam manufactured, and it is used wherever nonflammability or good resistance to oil is of importance. Recently there have been developed special nitrile rubber foams of good low temperature flexibility and adequate oil resistance. Mr. Talalay told the group that experimentally interesting foams have been made from *cis*-polyisoprene rubbers. Since these stereo-directed polymers cannot be made in emulsion polymerization, the latices have been made from these polymers by dispersing a solvent cement and stripping out the solvent. Mr. Talalay also discussed the development of silicone sponge rubber with its broad range of temperature properties. The compression-deflection properties of such sponge when measured at room temperature, at —90°F. and again after aging at over 500°F., are practically unchanged.

According to the speaker, with the multitude of present and potential ma-

The speakers at the Connecticut Rubber Group symposium which was held on February 19 at Waverly Inn in Cheshire, Conn. Left to right: Dr. Herbert A. Winkelmann (Dryden Rubber); Dr. Ray P. Dinsmore (Goodyear Tire & Rubber); Leon Talalay (B. F. Goodrich Sponge Rubber Products); Prof. Herman F. Mark (Polytechnic Institute of Brooklyn); and Dr. John T. Blake (Simplex Wire & Cable).

terials available, it is hardly surprising that the cellular materials industry as a whole has enjoyed a spectacular growth and promises to have a bright future in the decade of the 1960's.

The second symposium speaker was Dr. Winkelmann whose subject was "Mechanical Goods." In a survey of rubber usage in the mechanical goods area, he stated that the use of molded and extruded rubber products is on the increase. In 1959 the average automobile used 19.4 pounds of molded rubber products, exclusive of tires, foam, belting and hose, and this figure is expected to rise to 20.7 pounds by 1962. He added that the industry is constantly improving the physical properties of molded products. Over the past few years significant progress has been made in improving mechanical strength, abrasion resistance, aging characteristics, and resistance to high and low temperatures.

The speaker pointed out that in weather aging, natural rubber, butadiene-styrene rubber and nitrile rubber compounds are subject to attack by ozone unless properly compounded with fillers, waxes, antioxidants and antiozonants. Neoprene and butyl rubber resist attack by ozone, but selected compounds must be used. Thiokol, Hypalon, fluorinated hydrocarbons and polyurethanes give excellent protection against ozone.

Abrasion Resistance

According to Dr. Winkelmann, the polyurethanes also give better abrasion resistance than any of the other elastomers. In regard to temperature, he pointed out that natural rubber and butadiene-styrene compounds have limitations. Neoprene will function at 158° to 200°F.; nitrile rubber at 250°F.; silicone to 450° to 500°F.; fluorinated hydrocarbons at 550° to 600°F.; butyl rubber at 250°F.; and polyacrylate rubber at 300°F.

The Dryden vice-president emphasized that the new polymers have greatly broadened the range of elastomer compounds; however, the future demand is for higher temperatures than have been attained so far. In low temperature properties, polyurethanes have good performances, while silicone rubber is superior to all other elastomers.

Dr. Winkelmann also discussed the recent breakthrough in the field of adhesives. He explained that adhering vulcanized rubber to itself without the aid of heat and pressure was never successfully accomplished until the recent development of cyanoacrylate monomers. Splices made with this new material have held up to 18 months without deteriorating the bond. In regard to the 1960's, Dr. Winkelmann stated that changes and improvements in elastomers will continue, and mechanical rubber goods will function under conditions of service not deemed possible today.

The past chairmen of the Connecticut Rubber Group were in attendance at the group's symposium meeting on February 19. Left to right: F. J. Rooney (General Electric); Harry Gordon (Bond Rubber); R. H. Dudley (Whitney Blake); George R. Sprague (B. F. Goodrich Sponge Rubber Products); C. A. Larson (Whitney Blake); R. T. Zimmerman (R. T. Vanderbilt); W. H. Couch (Whitney Blake); and W. J. O'Brien (Seamless Rubber).

In his discussion on "Tires," Dr. Dinsmore said that the shortage of natural rubber is pressuring the industry into full-scale production of synthetic rubbers and the further development of new types of synthetic rubber. Developments in butyl rubber, neoprene, the acrylate copolymers, and the advent of various specialty rubbers and latices have enabled this country to raise its ratio of synthetic rubber consumption to the point where it is two-thirds of the total.

The speaker pointed out that almost everyone who is interested in a new type of synthetic polymer thought of the possible utilization of butadiene as a monomer. The early examination of *cis*-1, 4-butadiene polymers was disappointing because these rubbers proved to be not nearly so resilient as the corresponding polyisoprene, and in the raw state they had practically no tackiness and would not cohere well enough to sheet around a mixing mill. However, the latter difficulty was overcome by the admixture of at least ten parts of natural rubber, and it was found that mixtures of equal parts gave rather outstanding abrasion resistance.

According to the Goodyear vice-president in the Fall of 1960, Phillips Chemical Co. will have completed a plant for the production of about 20,000 tons of polybutadiene, and Shell Chemical Corp. will be in a similar position with respect to the production polyisoprene. The speaker felt that even though these quantities do not represent a large proportion of the country's rubber requirements, they will have an important psychological effect, and in all probability may represent the beginning of a series of such polymers.

Dr. Dinsmore told the group that a conservative projection would be for the production of these two new rubbers to reach a total of 50,000 tons next year; rising to 75,000 tons in 1962; 125,000 tons in 1963; and to 150,000 tons in 1964. This rate of growth, he added, might be doubled if the availability of natural rubber remains too low, or if the desirability of these rubbers is quickly established. At any rate, it seems certain that these new rubbers must be taken into account as important factors in the tire rubber requirements for the 1960's. According to Dr. Dinsmore, the stereospecific catalysts are certain to produce a number of new synthetic rubbers, of which the ethylene-propylene polymers announced by Montecatini are undoubtedly only the first of the series.

Advancing technology in the aviation field is creating new demands for the rubber industry, the speaker reported. Atomic-powered aircraft will require tires made from rubber capable of withstanding radiation and capable of performing at temperatures ranging from 100° to 1000°F. Dr. Dinsmore explained that so far the fluorinated rubbers, the high tensile fluoro silicones and perhaps chlorinated butyl offer the only leads to increased resistance to high temperatures.

In conclusion, Dr. Dinsmore stated that although the growth of the rubber industry in this country may be expected to be at a much slower rate than that of the rest of the world, diversification of rubber types caused by limitation of natural rubber supply and by new technological tire demands will undoubtedly be greater in this coming decade than at any time previously.

The final symposium speaker, Dr. Blake, in his talk on "Wire and Cable," stressed the impact of plastics on rubber markets. He pointed out that although the use of polymers by the wire industry has tripled since World War II, the use of rubber in this industry has not increased materially in the past 14 years.

According to the speaker, the major evolution which has been taking place in the use of insulating and protective materials since the end of the war will progress further. He emphasized that

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The 1960 officers of the Connecticut Rubber Group. Left to right: *Vice-Chairman*, Frank B. Smith (Naugatuck Chemical); *Chairman*, Vincent P. Chadwick (Armstrong Rubber); *Secretary*, A. Murdoch, Jr. (Armstrong Rubber); and *Treasurer*, Frank Villa (Whitney Blake).

there are a host of new materials which may play an important part in the wire and cable industry.

These new elastomeric materials include silicone rubber, fluorinated elastomers, polyurethanes, *cis*-polyisoprene, *cis*-polybutadiene, and ethylene-propylene rubber. Dr. Blake explained that although these materials are aimed at uses other than in the wire and cable industry, it remains for the industry to examine each of them in turn to see whether they can be adapted for wire, and whether they will have special properties which make their use advantageous.

The Simplex executive stated that silicone rubber is finding a limited but increasing use as high temperature flexible insulation. Fluorinated elastomers, which are suitable for very high temperature use, will find application in very special situations. However, their high cost prohibits any substantial volume consumption at present. Polyurethanes are not satisfactory for electrical insulation, but because of their extremely high resistance to abrasion, may find a limited use in protective jackets. *Cis*-polyisoprene and *cis*-polybutadiene are being produced in increasing quantities for the tire industry; however, it is possible that the latter will find some use in wire which must be used at very low temperatures. Ethylene-propylene rubber may find increasing use in high voltage insulation because of its superior ozone resistance. Since it is a pure hydrocarbon, its electrical properties will be excellent.

Dr. Blake informed the group that during the next decade polyvinyl chloride and polyethylene will probably be modified by copolymerization. This will accentuate their rapid increase in use. The vulcanization of polyethylene either by irradiation or by chemicals extends its maximum service temperature. He added that polypropylene, with its excellent electrical properties, probably will be modified greatly by copolymerization which will give rise to even more desirable materials. The speaker explained that predicting the ten-year future in a technical area cannot be done with any assurance. He stressed that there are no developments in sight which are likely to change the economic relationship between rubber and thermoplastics, and the present trends should continue for the next five years and probably for the next decade. Following each talk, moderator Fielding asked each panelist a number of presubmitted questions.

Members of the symposium committee who arranged the excellent program were V. P. Chadwick (Armstrong Rubber), F. B. Smith, (Naugatuck Chemical) and R. W. Ward (DuPont).

Because of the importance of this program to consumers and suppliers, the Connecticut Rubber Group plans to preserve the technical reports in the form of a brochure. This brochure will be available to all registrants at the meeting and members of the group.

The Connecticut Rubber Group has announced the results of its recent election of officers and directors. Elected to serve the group in 1960 were: *Chairman*, Vincent P. Chadwick (Armstrong Rubber); *Vice-Chairman*, Frank B. Smith (Naugatuck Chemical); *Secretary*, A. Murdoch, Jr. (Armstrong Rubber); *Treasurer*, Frank Villa (Whitney Blake); *Directors*, Francis H. Browning (Godfrey L. Cabot); Ken Crouse (J. M. Huber); William O'Brien (Seamless Rubber), and Rial Potter (Spencer Rubber Products).

Cosden Planning Styrene Expansion

► Cosden Petroleum Corp., Big Spring, Texas, reports that it will strengthen its position in the fast-growing petrochemical market with the erection of facilities to triple its styrene capacity. The multi-million dollar project, including two major processing units, was forecast by R. L. Tollett, president of Cosden, in his report of operations for the six months ended October 31, 1959. The unit will expand the firm's styrene capacity to 60 million pounds annually when completed late in 1960, Mr. Tollett states.

Named Sales Representative

► Beacon Chemical Industries, Inc., Cambridge, Mass., has announced the appointment of Laurence R. Clarke as New England representative for rubber chemicals. Affiliated with the rubber and plastics industries since 1927, Mr. Clarke started Clarke Associates as engineering consultants in 1958 and as chemical and equipment manufacturers representatives in 1959. Mr. Clarke, a native of Boston, Mass., was graduated from the School of Engineering of Northeastern University in 1927 with a degree of B. Ch. E.

He has served as analytical chemist for the General Electric Co. and chief chemist and assistant superintendent for the Clifton Manufacturing Co. He joined Haartz-Mason, Inc., in 1930, serving that firm as chief chemist, factory superintendent, factory manager, vice-president in charge of production, vice-president, and director. Mr. Clarke is a member of the Boston Rubber Group, and was chairman of that group in 1943. He is also a member of the Rubber Division of the American Chemical Society, A. S. T. M., and Subcommittee IX of A. S. T. M.

Firestone Retread Guarantee

► Firestone Tire & Rubber Co., Akron, Ohio, has initiated a program to make it possible for its dealers and stores to give a nation-wide guarantee on retreaded tires. The guarantee applies to tires retreaded with Firestone tread rubber having the firm's tread designs and identified with its quality medallions. The quality tread medallion program was undertaken to help customers identify quality and workmanship in retreaded tires, the company states. Medallions will be cured into the shoulders of retreaded tires by retreaders who follow the firm's retreading specifications and who use its camelback. They will be applied to all passenger and truck retread tires in all sizes and types when the company's quality materials have been used in accordance with its workmanship standards.

Rowe Joins U. S. Rubber

► Perce C. Rowe has been elected a group executive vice-president of the U. S. Rubber Co., New York, N. Y. In his new capacity, he will be responsible for all activities of the Tire Division. Born in Monessen, Penna., Mr. Rowe was graduated from Columbia University in 1928 with a B.A. degree in business administration. He joined the Flintkote Co. in 1929 as a sales representative in the Patent and Licensing Corp., a wholly-owned Flintkote subsidiary. In 1936, he was elected vice-president and director of the company and initiated its first diversification program. He was made executive vice-president in 1937 and was elected president and chief administrative officer in 1957. Mr. Rowe became president and a director of Curtis Companies, Inc. in 1959.

To Expand Earthmover Tire Plant

► Earthmover tire production facilities at the Topeka, Kansas, plant of the Goodyear Tire & Rubber Co., Akron, Ohio. will undergo a $4 million expansion. Tire production equipment will be installed in a new building, measuring 350 feet by 100 feet. To be completed by 1961, the expansion will increase earthmover tire capacity substantially and capacity to manufacture larger sizes will also be increased. Goodyear's new production facilities at Topeka will accommodate the maximum tire sizes presently anticipated by the construction equipment industry, with largest sizes measuring close to 10 feet from tread to tread and 3 feet from sidewall to sidewall. Production facilities have already been expanded at Goodyear's metal products plant in Akron to build larger rims for the new earthmover tires.

H. K. Porter Appoints Balogh

► H. K. Porter Co., Inc., Pittsburgh, Penna., has announced the appointment of Elmer J. Balogh as general sales manager of its subsidiary, Patterson-Sargent Co., Cleveland, Ohio. Mr. Balogh is a graduate of Miami (Ohio) Univeristy with a B.S. degree in business administration. He previously was sales manager of the Graphic Arts Sales Division of Sherwin-Williams Co.

Davidson Rubber Closing Plant

► Davidson Rubber Co., Charlestown, Mass., reports that it is discontinuing operations at its Charlestown plant on March 31, 1960. The company also states that it will discontiue its molded, solid and chemically-blown sponge rubber product lines. According to Davidson, the move will allow its full resources to be devoted to its expanding lines of molded polyurethane foam products now being produced at its Dover, N. H., plant. The company reports that its general offices will be moved to Dover, and the Charlestown plant has been sold to American Mills, Inc., of Worcester, Mass.

Stier Named Nopco President

► Nopco Chemical Co., Newark, N. J., has announced that George G. Stier has been named president of the company. Mr. Stier succeeds Ralph Wechsler who has been named chairman of the board of directors. Mr. Stier attended Newark University, now part of Rutgers University, and joined Nopco in 1932. He previously was vice-president in charge of the firm's Plastics Division. The company also announced that Harry A. Batley has been elected executive vice-president, succeeding G. Daniel Davis who has been elected vice-chairman of the company.

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Names in the News

Charles H. Sturgeon, general traffic manager of B. F. Goodrich Co., has become the first American to be elected an associate of the Institute of Transport of Great Britain.

J. L. Ernst has been named by Enjay Co. as its Akron, Ohio, district manager.

Charles A. Church has been named sales promotion manager for the Firestone Synthetic Rubber & Latex Co.

James R. Cooper has been named general sales manager of the Vulcan Rubber Products Division of Reeves Brothers, Inc., and **Walter A. McEvilly** succeeds him as product manager in New York.

J. F. Warnell has been appointed vice-president, sales, and **A. J. Adams** has been named vice-president, production, of Union Carbide Consumer Products Co., a division of Union Carbide Corp.

Dr. Harry H. Weinstock, Jr., has been appointed to the newly-created position of coordinator, polyamide research and development for the National Aniline Division of Allied Chemical Corp.

J. Craig Cameron has been named manager of technical services, and **George J. Jones** has been appointed technical superintendent of footwear at B. F. Goodrich Footwear and Flooring Co.

C. E. Jackson, previously with Paranite Wire & Cable Corp., has joined Central Cable Corp.

John U. Wolter has been named assistant manager of the Industrial Organic Chemicals Department of the Michigan Alkali Division of Wyandotte Chemicals Corp.

Edgar E. Hardy, formerly director of research for Mobay Chemical Co., has joined Monsanto Chemical Co. as development associate.

Haro'd S. Reed has been appointed director of the newly-formed Industrial Relations Department of McCreary Tire & Rubber Co., and **Lawrence M. Longworth,** previously chief chemist, succeeds him as development manager and head of the Technical Department.

Benjamin P. Cooper has been appointed sales manager for the Firestone International Co.

E. J. O'Leary, president and chairman of the Ruberoid Co., has been elected a director of Cumberland Chemical Co.

Ronald P. Marsh, previously with Phillips Chemical Co., has joined Mobay Chemical Co. as a technical service representative for Merlon polycarbonate resins. **Milton A. Netcher,** formerly with American Cyanamid Co., has joined Mobay as a technical trainee.

William F. Gerrow, Jr. has been appointed by International Latex Corp. as its regional sales manager for the southern area.

John T. Lumis, previously assistant to the vice-president of Wilson Petrolcoke & Carbon Corp., has been named sales manager for the company.

Dr. Paul S. Stutsman, assistant to the president of Texas-U. S. Chemical Co., has been named manager of the firm's butadiene operations.

Gabriel F. Doria, formerly with Graver Water Conditioning Co., has joined U. S. Stoneware Co. as a technical representative.

Robert W. Lawrence has been named resident sales representative in Kansas City, Mo., for the Michigan Alkali Division of Wyandotte Chemicals Corp.

E. W. Ryan has been appointed superintendent of the Latex and Reclaim Division of Dominion Rubber Co., Ltd.

Joseph A. Martino, president of National Lead Co., has been elected a director of Goodyear Tire & Rubber Co.

Mort Leggett, editor of Wingfoot Clan, the employee newspaper of Goodyear Tire & Rubber Co., has been named manager of the firm's nationwide publication.

George W. Poland, Jr., of E. M. Sergeant Pulp & Chemical Co., has been elected president of the Salesmen's Association of the American Chemical Industry, Inc.

John F. Daley, vice-president and a member of the executive committee of E. I. du Pont de Nemours & Co., Inc., has retired after 45 years of service. He retains his position as a member of the board of directors.

Harry Turkel, International Minerals & Metals Corp., and **William Flynn,** Great Eastern Packing & Paper Stock Corp., have been named co-chairmen of the Hospitality Committee for the 47th Annual Convention of the National Association of Waste Material dealers.

Howard Shannon

Joins American Hard Rubber

► Howard Shannon, president of the Supplex Co., Garwood, N. J., has been named president of American Hard Rubber Co., Butler, N. J., succeeding Newton H. Tuthill, who has resigned. Mr. Shannon, who will retain his post at Supplex, has been associated with Amerace and affiliated companies since 1940. He was acting controller of American Hard Rubber until his appointment in 1955 as vice-president and general manager of Supplex. Mr. Shannon is a native of New Jersey and was graduated from Newark College of Engineering as a chemical engineer.

Quebec Group Holds Joint Meeting

► A joint technical meeting was held by the Quebec Rubber and Plastics Group and the Quebec Section of the Society of Plastics Engineers on January 21 at Ruby Foo's Restaurant in Montreal, Quebec, Canada. Over 150 members and guests heard an address by Dr. E. C. Bernhardt (DuPont) on the "Theory of Extrusion." The speaker explained, with the use of slides and movies, what happens inside an extruder and showed several different methods of predicting output of the machine. The meeting was under the joint chairmanship of Robert Huggenberger (Dominion Rubber), representing the Quebec Rubber and Plastics Group, and Lloyd Meredith (Canadian Industries Ltd.), representing the Society of Plastics Engineers.

Buys Dicks-Armstrong-Pontius

► Plough, Inc., Memphis, Tenn., maker of drugs and a variety of household products, has acquired Dicks-Armstrong-Pontius, Inc., Dayton, Ohio, producer of caulking compounds and related home repair items. The transaction involved an exchange of 50,053 shares of Plough stock for all of the outstanding shares of D-A-P. D-A-P, with annual sales running about $6 million, will be operated as a wholly owned subsidiary under Plough's newly created Household Products Division, according to the company.

Relocates Chicago Office

► The Chicago sales office for B. F. Goodrich flooring, carpet cushion, industrial cellular materials and Koroseal vinyl upholstery and wall covering material has been moved to Space 13-115 of the Merchandise Mart from its former location at 4646 West Lake St. This relocation is expected to improve service to the furniture and bedding industry and the architectural and decorating professions of western Indiana, Illinois and Wisconsin. Earl E. Hecker, sales representative for the Plastic Products Division of the Goodrich Industrial Products Co., will manage sales of Koroseal vinyl fabrics at the new office.

William H. Warmbold, Chicago district manager for the Goodrich Footwear and Flooring Co., will direct sales of all resilient flooring products and accessories in rubber, vinyl, asphalt and vinyl asbestos. J. P. Ertel, Chicago sales representative for Goodrich Sponge products, will direct carpet cushion sales and Charles Gilles, midwestern sales representative for the Sponge Products Division, will manage sales of industrial cellular materials.

American Zinc Names Two

► American Zinc Sales Co., St. Louis, Mo., has announced that George R. Throop, Jr., has been named Midwest sales manager with headquarters at Columbus, Ohio, and W. J. Belin has been named Southern sales manager with headquarters in St. Louis. Mr. Throop is a graduate of Washington University. He joined American Zinc in 1940 and served in the Accounting Department. From 1942 to 1946, he served in the United States Navy, and rejoined the company in 1948 as Chicago district manager. Mr. Belin graduated from Davidson College in 1941. He served with the United States Army following graduation and joined American Zinc in 1947 as a member of the Sales Department. In 1948 he transferred to the Pigment Sales Division, and in 1955 he was named central district manager.

New Goodrich Farm Tire

► B. F. Goodrich Tire Co., a division of the B. F. Goodrich Co., Akron, Ohio, has developed a new nylon tire for farm wagons and implements, combining passenger tire tread, for good wear on hard surfaces, with extra tread width for high flotation on soft surfaces. The new tire, available in 7.60-15 6-ply rating, has all nylon construction in order to give protection against bruises. The tread has added depth to prevent excessive side slip. The tire has a carrying capacity of 1765 pounds at 20 miles an hour and is recommended for wagons and trailers, for front tractor wheels, and to support heavy mounted tools. Industrial uses include air compressors, low-boy transport trailers and jack drills, the company said.

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Financial News

U.S. Rubber Sales and Income In 1959 Hit Record High

► U. S. Rubber Co., New York, N. Y., reports that its sales for 1959 increased 12 per cent and its net income increased 57 per cent, both figures setting new records. Net income for 1959 was $35,580,081, equal to earnings of $5.30 per share of common stock after preferred dividends. This compared with 1958 net income of $22,670,772, or $3.05 per share, and with the previous record high in 1955 of $33,559,494, or $5.04 per share. Net sales for 1959 totaled $976,765,702, compared with $870,615,700 in 1958 and the 1955 record of $925,539,092. The new records were set in spite of a 22-day strike of company employes in April and the 116-day steel strike which curtailed automobile production and in turn slowed sales of tires and other automotive products.

The company reports that its Federal and foreign income taxes in 1959 amounted to $40,176,803, compared with taxes of $26,469,286 in 1958. The firm's long term debt was reduced during 1959 from $164,656,700 to $159,919,560. Net working capital at the end of the year was $312,221,586, for a working ratio of 3.2, compared with $295,744,409 and a ratio of 3.3 at the end of 1958. Additions and improvements to property, plant and equipment totaled $25,002,545 in 1959, compared with $27,576,070 in 1958. Depreciation charged to earnings was $24,409,055 in 1959, and $24,706,229 in 1958.

Interchemical Corp.

► For 1959: Net income amounted to $6,591,000, equal to earnings of $3.10 per share of common stock, compared with $4,684,000, or $2.15 per share for the same period a year ago. Net sales for 1959 totaled $122,592,000, compared with $109,489,000 in the previous year.

Pierce & Stevens

► For 1959: Net income was $620,851, earning 96c per share of common stock, compared with $513,193, or 79c per share for the 1958 fiscal year. Net sales in 1959 amounted to $8,100,036, compared with the 1958 total of $7,477,111.

Goodyear (Canada)

► For 1959: Net income amounted to $2,326,533, equal to common share earnings of $7.95, compared with $3,864,241, or $13.92 for the 1958 fiscal year.

Dayton Rubber

► Year ended October 31: Net income after taxes amounted to $2,414,226, earning $2.16 per share of common stock after allowing for Class A dividend requirements, compared with $1,324,434, or $1.19 per share for the previous fiscal year. Net sales for the 1959 year-ended period totaled $101,838,313, compared with $85,509,634 for the like period a year ago. Net income for the 1959 fiscal year does not include Dayton's share of the undistributed earnings of Copolymer Rubber and Chemical Corp.

Midwest Rubber Reclaiming

► Year ended October 31: Net income for the 1959 fiscal year amounted to $1,125,135, equal to earnings of $3.07 per share of common stock, compared with the 1958 fiscal year income of $724,347, equal to $2.39 per share. Net sales for the 1959 period totaled $12,795,896, compared with $9,428,669 in fiscal 1958.

Plymouth Rubber

► Year ended November 28: Net income amounted to $1,246,959, or $1.52 per share of common stock, compared with $899,740, equal to earnings of $1.01 per share for the fiscal year of 1958. Sales for the current fiscal year totaled $23,845,730, compared with $19,651,922 the previous year.

Mohawk Rubber

► For 1959: Net income amounted to $1,219,000, equal to $2.48 per share of common stock, compared with $1,065,375, equal to $2.16 per share for the preceding year. Net sales for the 1959 fiscal year totaled $31,656,000, compared with $25,513,203 in the previous year.

St. Joseph Lead

► For 1959: Net income after taxes amounted to $6,263,076, or $2.30 per share of common stock, compared with $3,986,880, equal to $1.47 per share for the 1958 fiscal year. Net sales for the 1959 fiscal year totaled $86,179,208, compared with the 1958 figure of $75,615,147.

United Elastic

► For 1959: Net income amounted to $2,604,020, equal to earnings of $5.15 per share of common stock, compared with $1,804,009, or $3.57 per share for the 1958 fiscal year. Sales for 1959 totaled $33,389,759, compared with $25,521,036 in 1958.

Rubber Technology Discussed

► The February 1 meeting of the North Jersey Section of the American Chemical Society, held at Seton Hall University, South Orange, N. J., featured three papers of interest to the rubber industry. In the first, W. E. Wolstenholme, research physicist at the Research Center of the U. S. Rubber Co., Wayne, N. J., described the Stress Relaxometer, a test instrument he invented to measure the useful life of newly developed thermoplastics. He reported that scientists have had only a limited knowledge of the useful load-bearing life of newly developed thermoplastics. In experiments with the new instrument, accelerated life tests of four weeks were used to determine the useful life of plastics equivalent to eight to ten years.

Another speaker, T. D. Talbott, chemist at the Research Center, described a rapid method, using color, to establish antioxidants used in rubber products to protect them from deterioration due to aging. Mr. Talbott was co-developer of this method with C. L. Hilton, research scientist at the Research Center. Dr. C. P. Roe, a research chemist at U. S. Rubber's Research Center, discussed soap mixtures used in making certain types of synthetic rubber which sometimes fail to produce the expected materials, giving the reasons for this behavior. Dr. Roe was co-author of this technical paper with Dr. P. D. Brass, research associate at the Research Center.

Rubbermaid

► Three months ended December 31: Income for the first quarter amounted to $448,926, equal to earnings of 33c per share of common stock, compared with $265,595, or 19c per share for the like period a year ago. Net sales for the first quarter totaled $6,834,425, compared with $5,214,286 for the 1958 first quarter.

General Tire & Rubber

► Year ended November 30: Net income after taxes amounted to $26,624,080, or $4.48 per share of common stock, compared with the previous fiscal year figure of $11,279,117, equal to earnings of $2.06 per share. Net sales for the period totaled $676,942,133, compared with $469,782,099 a year ago.

Allied Chemical

► For 1959: Preliminary report: Net income after taxes amounted to $50,040,519, equal to common share earnings of $2.51, compared with $34,225,839, or $1.72 per share for the 1958 fiscal year. Sales and operating revenues totaled $719,661,616 in 1959, compared with $635,532,054 in 1958.

DuPont Names Meyer and Keen

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced the appointments of Edwin A. Meyer as control manager and W. Newlin Keen as assistant control manager of its Elastomer Chemicals Department. Mr. Meyer, previously assistant control manager, succeeds A. Lynam Satterthwaite who has retired. Mr. Meyer received a B. S. degree from Harvard College in 1937, and a master of business administration degree from New York University School of Business Administration in 1940. Prior to joining DuPont in 1948 as a member of the Treasurer's Department, he was a senior accountant for Price, Waterhouse & Co. In 1953, Mr. Meyer was named assistant control manager of the Photo Products Department.

Mr. Keen joined DuPont in 1941 after graduating from the University of Delaware with a B. S. degree in mechanical engineering. His first post was that of a mechanical engineer at the firm's Rubber Laboratory, and in 1951 was named a division head. In 1955, Mr. Keen was appointed assistant manager of the Akron district and the following year he returned to the Elastomer Laboratory. Since 1958, until May 1959, he was supervising project manager during construction of the Elastomer Laboratory for the DuPont Co. (United Kingdom) Ltd., at Hemel Hempstead, England. Prior to his present appointment, Mr. Keen was superintendent at the Elastomer Laboratory in Wilmington.

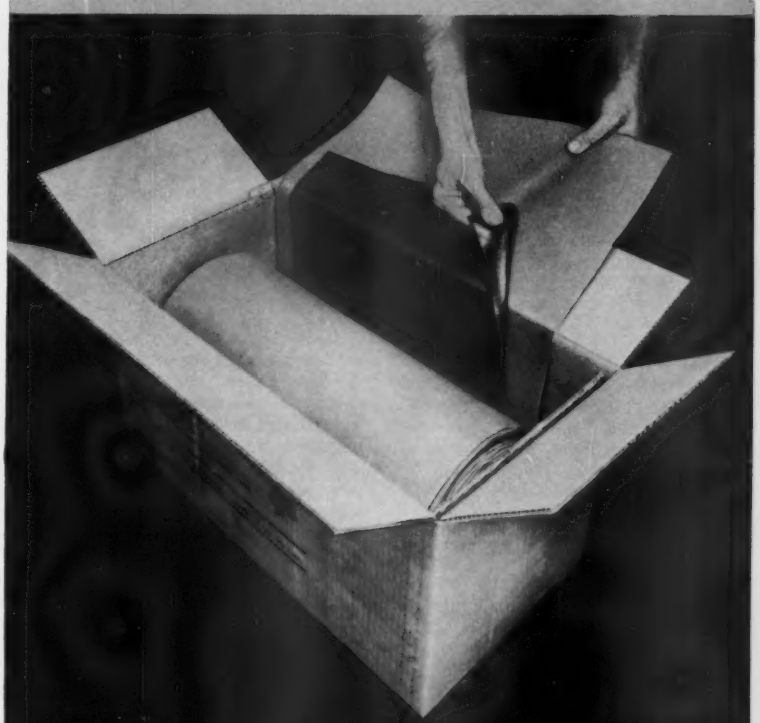
Firestone Forms New Division

► Firestone Tire & Rubber Co., Akron, Ohio, has announced the formation of a new division to produce and market its new plastic development, Fibrocast, According to Firestone, Fibrocast is a blend of several fiber and synthetic resins which results in an easily molded material for use in automotive and aircraft production, in the communication field and for such items as luggage. The material will be produced at Magnolia, Ark., and initial production will be for air ducts in ventilation systems for buses and cars, in auto door panels and in package trays. The company also announced that W. C. Gohr, previously sales manager for the Firestone division that makes air springs, has been named general manager of the Fibrocast Division.

Named Harchem Division President

► Wallace & Tiernan, Inc., Bellevelle, N. J., has announced that Bruce Ainsworth has been appointed president of the Harchem Division. In this capacity, he will be responsible for all division activities including research, product development, production and sales. Mr. Ainsworth, formerly assistant to Charles H. Rybolt, president in charge of the company's Chemical Divisions, was formerly associated with the Celanese Corp of America.

2 useful services...



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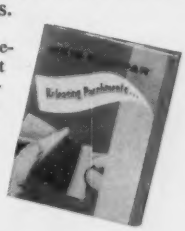

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United Carbon Plans Research Center

► United Carbon Co., New York, N. Y., plans to construct a $2,500,000 research center, just outside of Houston, Texas, on a 32 acre site which will allow for future expansion. The company plans to house a major part of its research staff and most of its operating units at this location. Construction of a three building unit is now under consideration. This includes a one story, 40,000 square foot office building and 37,000 square foot one story laboratory with an adjacent polymer development facility. As planned, the office building will have a fully equipped cafeteria and lounge for the 200 United Carbon employees who will relocate at the new quarters. In addition to research and development groups, most segments of the company's distribution, traffic, engineering, manufacturing, purchasing, and finance divisions will be housed at the new site. Completion is expected in 1961.

Coordinate Carbon Facilities

► Columbian Carbon Co. and the Continental Carbon Co., New York, N. Y., have agreed to coordinate manufacturing facilities of their two major plants in the European area. Columbian Carbon has purchased an interest in Continental's new 25-million-pound carbon black plant in Rotterdam, Holland, which will be operated as Continental-Columbian Carbon (Nederland) N. V. This plant will be in production in mid-spring of this year. Continental Carbon has purchased an interest in the new 60-million-pound carbon black plant being built by Columbian Carbon at Trecate, near Milan, Italy. This plant, to be completed in late fall, 1960, will be operated as Columbian Continental Europa S. p. A. International marketing of the production of both plants will be handled by Columbian Carbon International, Milan, for Columbian Carbon, and Witco Chemical Co., Ltd., London, for Continental Carbon.

Midwest Rubber Opens Plant

► Midwest Rubber Reclaiming Co., which operates a plant in Barberton, Ohio, has reopened a facility in Chester, Penna., to serve the eastern part of the country. In addition to Barberton, the company also has rubber reclaiming operations in East St. Louis, Ill., and Paramount, Calif. Joseph Wilson has been transferred from the East St. Louis headquarters to Chester as plant superintendent.

Witco Acquires Two Firms

► Witco Chemical Co., Inc., New York, N. Y. has acquired, in an exchange of stock, Tar Distilling Co., maker of coal tar chemicals, and Old Colony Tar Co., producer of tar paving materials. Both companies will operate as Witco subsidiaries. Tar Distilling has plants in Cleveland and Old Colony has four plants in Massachusetts. Both companies were privately held by the same interests. J. Porter Brinton, Jr., chairman of both firms, has been elected as director of Witco and a member of its executive committee. Witco officials did not disclose the amount of stock paid for the two companies, but said disclosure would be made in the company's annual report.

Government Services Described

► National Science Foundation is publishing a series of reports which describe the activities of the various agencies of the U. S. government in providing scientific information. Scientific information services of the Patent Office and other government offices are described in report NSF 59-58, entitled "Scientific Information Activities of Federal Agencies, November 1959, Number 3, United States Department of Commerce—Part I." Copies of the report, priced at 15c, may be obtained from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Establishes New Main Office

► Skeist and Schwarz Laboratories, Inc., has established its main office and laboratory at 101 W. 31st St., New York, N. Y. The original company location at 89 Lincoln Park, Newark, N. J., will continue as a branch office and laboratory. The firm has also made several new appointments including Henry J. Rynkiewicz as laboratory director; Dr. Reinhard Eck as research associate; and Henry C. Speel as associate. Mr. Rynkiewicz was formerly with the Surgical Products Division of American Cynamid Co. as research specialist in mechano-electrical devices for quality control and automated production systems. He also held research posts in the American Medical Association, Tile-Tex Co. and Johnson and Johnson, Inc.

Dr. Eck was associated for many years with United Piece Dye Works as manager of resin products research and production for textile finishes and pigment printing. Mr. Speel, co-editor with Dr. Schwarz of "Textile Chemicals and Auxiliaries", was formerly director of development of Wyandotte Chemical Corp. He was also associated with the General Aniline & Film Corp. and Atlas Powder Co. before becoming a consultant specializing in surfactants and chemical economics.

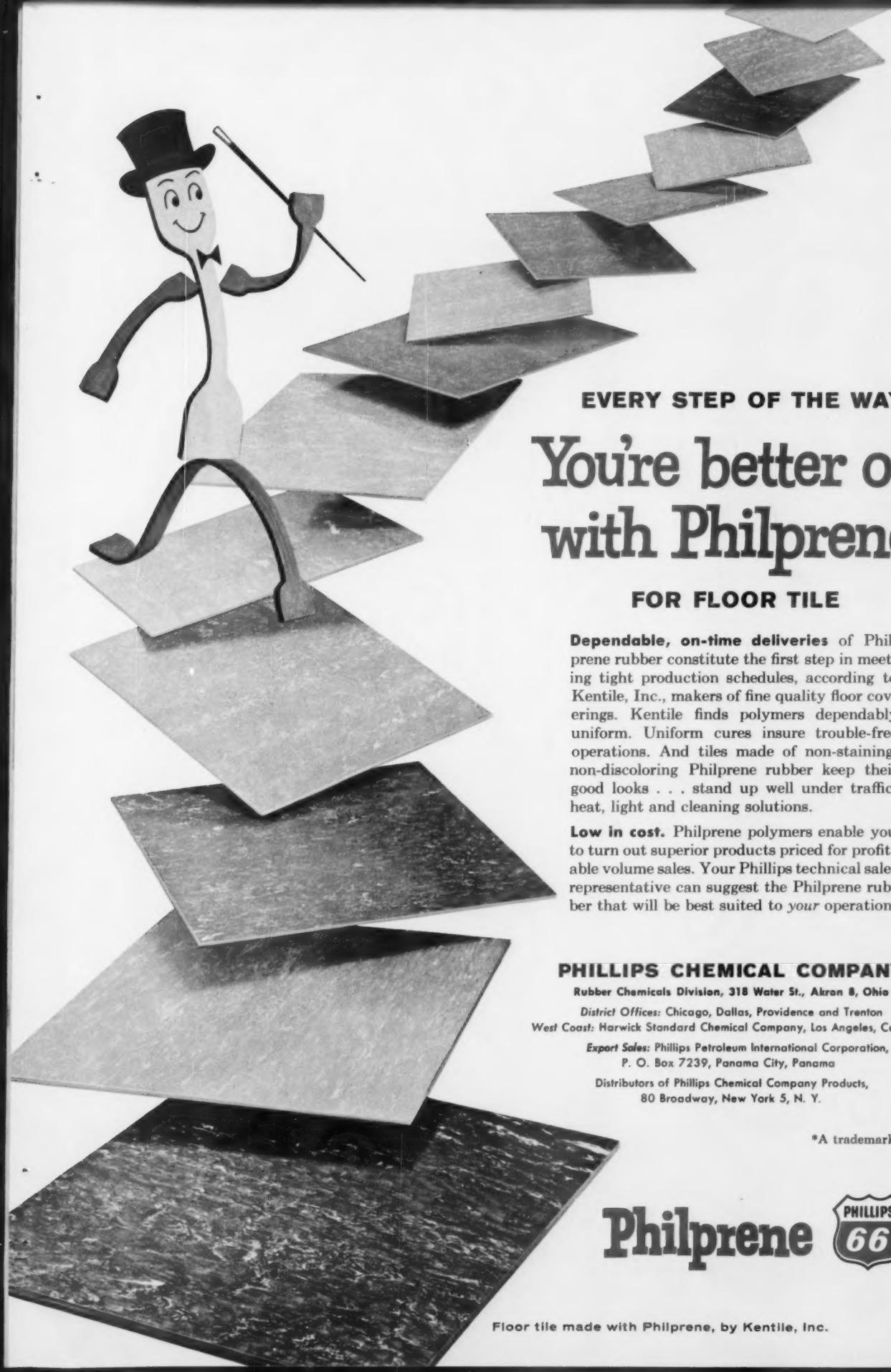
Dayton to Buy Hose Concern

► Dayton Rubber Co., Dayton, Ohio, has agreed to acquire the assets of Metal Hose and Tubing Co. of Dover, N. Y. Metal Hose and Tubing, which has been in operation since 1912, is a manufacturer of steel and fiber reinforced rubber hose, sold under the trade name of National, principally for use on gasoline pumps for service stations, fueling of aircraft and other petroleum and service applications.

Acquisition of this firm is expected to give the Dayton Industrial Products Division a major source of supply for highly engineered high pressure hose and fittings. There will be no change in management or present distribution policies of Metal Hose and Tubing, which will be operated as an autonomous subsidiary. The company will continue to market its products under the established National brand. William D. Magagnos is president of the firm.

Oliver Speaks To Ontario Group

► The Ontario Rubber Group heard W. Oliver (Sun Oil) speak on "The Manufacture and Use of Petroleum Oil for Rubber Processing," at its meeting on January 19 at the Pickfair Restaurant in Toronto, Ontario, Canada. Mr. Oliver discussed, in general terms, the manufacture of rubber processing oils, their chemical composition, definitions and terms used and their applications.



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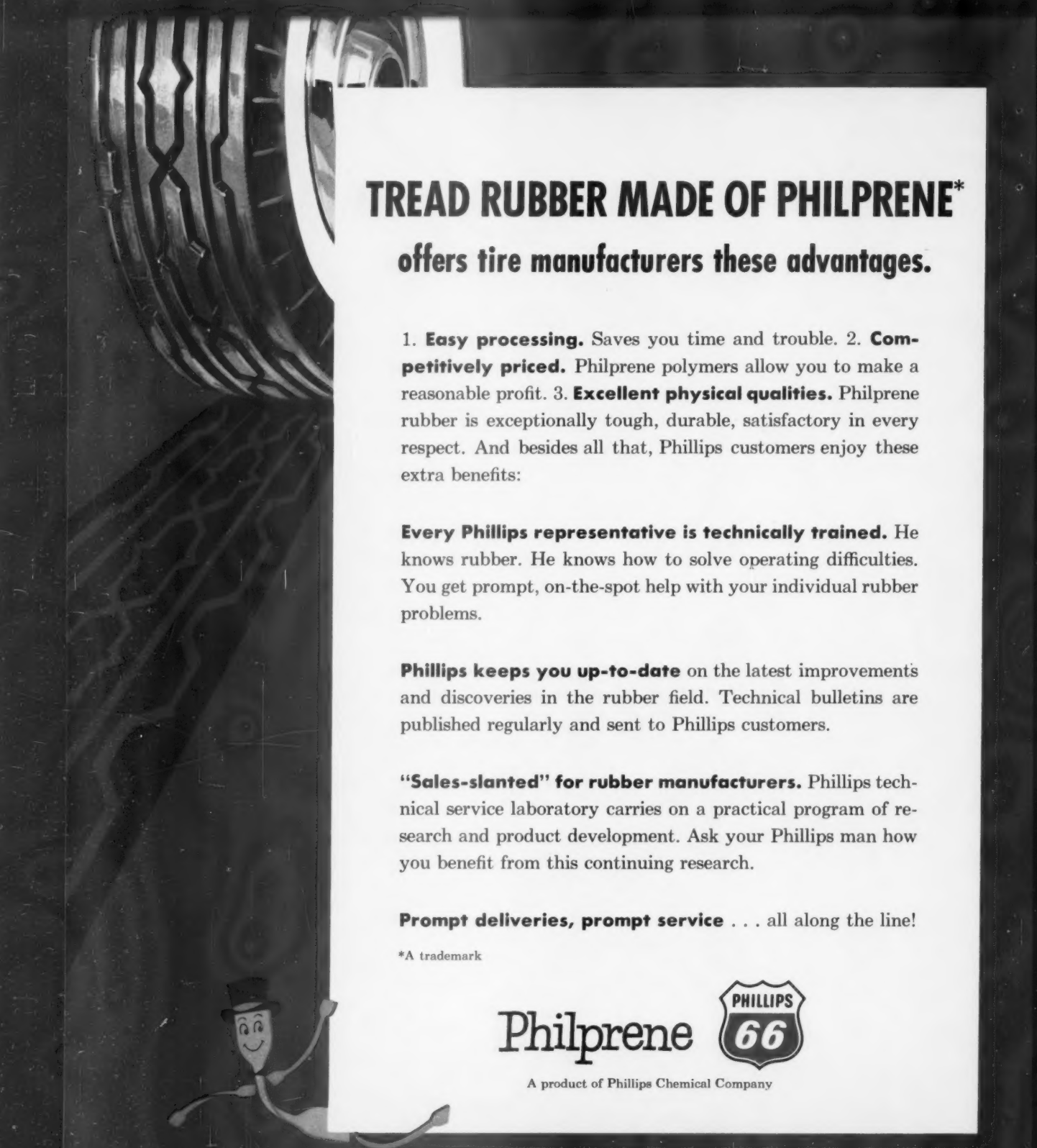

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Baker Castor Oil Names Two

► Baker Castor Oil Co., Bayonne, N. J., has appointed Joseph L. Montague as a development engineer and Dorian Doptoglon as a research chemist to its technical staff. According to the company, the appointments reflect its increased technical effort toward new products development. Mr. Montague is a graduate from Rensselaer Polytechnic Institute with a degree in chemical engineering. Prior to joining Baker, he had been with Naugatuck Chemical Division of U. S. Rubber Co. as a process development chemist, and with the Inorganic Chemicals Division of Monsanto Chemical Co. as a research chemical engineer.

Mr. Doptoglon holds a B. S. degree in chemistry from Brooklyn Polytechnic Institute and an M. S. degree in chemistry from the University of Cincinnati. He is presently completing the requirements for his doctorate in chemistry at Brookly Polytechnic. Mr. Doptoglon has had diversified industrial experience as a research chemist in urethane prepolymers, general organic intermediates and textiles. He previously served with such firms as Verona-Pharma Chemical Co., Coats and Clark, and Brown Rubber Co.

Reclassifies Urethane Elastomers

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., reports that a second liquid urethane elastomer of the Adiprene L type has been removed from the experimental classification as the result of increased acceptance, growing interest in the broad range of properties offered by the new materials, and improved production technology. The material, formerly known as LD-167, is now designated as Adiprene L-167 urethane rubber. The original product in the field, Adiprene L, is now termed Adiprene L-100 in order to start a standard of nomenclature for this family of urethane elastomers, the company states. A third product, LD-213, continues in the experimental category for investigation by industrial users interested in elastomeric products with extreme hardness and resistance to impact and abrasion, the company reports.

Elected by Tamms

► The board of directors of Tamms Industries Co., Chicago, Ill., has elected Fred Knisley, formerly vice-president of the Foundry, Flooring and Raw Materials Division, to the new post of vice-president and treasurer. Mr. Knisely will be responsible for all financial affairs of the company as well as supervision of all accounting, credit, collections and insurance matters. He has been associated with Tamms since 1925. According to the company, the appointment is part of a long-range plan of personnel realignment resulting from the company's growth.

Develops Cold Type Polymer

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has announced the development of a new fatty acid emulsified, cold type styrene-butadiene copolymer. Called Ameripol 4600, the polymer is reported to be similar to No. 1502 type polymer, except a fatty acid emulsifier is used instead of mixed fatty acid rosin soaps. Ameripol 4600 has its Mooney in the 36-48 range, rather than the 46-58 range and it is lighter in color because of the sulfoxylate method of activation, the company states. The new polymer, according to Goodrich-Gulf, was produced primarily to provide rubber processors with an easier processing rubber exhibiting a faster cure rate, higher modulus, and less tack than 1502 polymer. The reduced Mooney range also provides less power consumption at the processor's plant, the company claims. From extensive field tests conducted during the past year, the company believes that Ameripol 4600 will be ideal for use in shoe soles, floor tiles, sponge, white sidewalls, sporting shoes and household goods.

Beebe Rubber Building Addition

► Beebe Rubber Co., Nashua, N. H., has announced that it is building an addition to its plant which will house larger and more modern equipment. The company anticipates a 340 per cent increase in production capacity when the addition is completed. The new addition, the fifth since the firm started volume production of Ripple sole in 1955, will be a two and a half story section and contain 6,000 sqaure feet of ground floor space plus additional working and storage areas on overhead platforms. The company also announced that construction has been started on a new laboratory. This addition is expected to be completed shortly and will be a one story, brick structure with approximately 2,800 square feet. It will be used for quality control, research and development of new products and compounds for the footwear field, the company states.

Anaconda Appoints Four

► Anaconda Wire & Cable Co., New York, N. Y., has announced the appointment of David E. Allen, vice-president, sales, as executive vice-president, succeeding Richard E. Steinmetz, who was recently elected president. The company has also named William H. Benton, Jr., formerly general manager of mills, as vice-president, manufacturing. He succeeds Vito F. Di Lustro, who will retire at the end of the year. John L. Tindale, formerly commerical vice-president, has been advanced to the newly-created position of vice-president, marketing and sales, while Henry V. Van Valkenburg, previously general sales manager, has been promoted to vice-president and general sales manager.

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West Coast News

► Four tons of scientific journals are on their way to universities in the Orient due to the efforts of Dr. D. B. Luten, research chemist of the Shell Development Co., Emeryville, Calif. Dr. Luten collected the technical literature for the Asia Foundation's Books for Asian Students Program on behalf of the California Section of the American Chemical Society. The journals were donated primarily by Bay Area members of the American Chemical Society. Dr. Luten reports that the journals, over 6,000 single items, are scheduled for the University of Dacca in East Pakistan and for the new Nara State Medical College near Kyoto, Japan.

According to Dr. Luten, the Japanese Government has required the new school to have the principal publications of the American Chemical Society in its library. The current shipment is the second made by Dr. Luten. In 1959, he collected 3½ tons of journals which have since been received by the University of the Punjab and the Universities of Karachi and of Peshawar in Pakistan. According to Carlton Lowenberg, chief of the book program for the Asia Foundation in San Francisco, nearly 300,000 journals and over a million books have been shipped to the Orient in the five years that the program has been in effiect.

► The Los Angeles Rubber Group held a technical and dinner meeting on February 2 at the Biltmore Hotel in Los Angeles, Calif. Walter J. Dugan (General Electric) was the speaker at the technical session, and John Pettley, noted British humorist, was the guest speaker at the dinner program. Mr. Dugan's talk was called "Make or Buy?" and he discussed the technology of the newer types of reinforced gums. He analyzed the equipment requirements, relative compound costs and other factors to be considered in making the decision to use purchased compound, gum or reinforced gum. Mr. Pettley's topic was "An Englishman at Large in America." He related how he reacted to the American way of life, dealing with the subject humorously.

The group reports that its Memorial Scholarship Fund at the University of Southern California has received substantial donations recently which will greatly increase its effectiveness to the rubber industry and young students. According to Tlargi, Lombard Smith (Lombard Smith Co.) made a grant of $5,000 in memory of his wife. Mr. Smith stipulated that this grant was to be made immediately available for scholarships. Arrangements have been made by Tlargi to grant two "Virginia Smith Awards" in each school year of 1960 through 1962 and one in 1963. Charles Kuhn (Master Processing Corp.), 1959 Tlargi chairman, in lieu of Christmas gifts to customers of Master Processing, donated $800 to the group's endowment fund.

Several members of Tlargi participated in the Los Angeles Open Pro-Celebrity Golf Tournament, which was held at Fox Hills on January 7. Those who participated were Jack Cunningham (Shell Chemical); Cam Johnson (Caram Mfg.); Leonard K. Firestone (Firestone); H. L. Brandenburg (Firestone); Harry Franklin (Stillman Rubber); Doc Sears (Stillman Rubber); Bob Johnson (Crown Rubber). Cam Johnson's foursome was low net winner, while Don Montgomery and H. L. Brandenburg played with the foursome that tied for 4th place low net.

Tlargi has also announced that several new members have joined the group. They are Jack A. Wright (W. J. Voit Rubber); Thomas R. Bouck, Jr. (Pacific Moulded Products); Harold B. Gartner (American Latex); Robert L. Goodell (C. L. Chemicals); Raymond M. Hopper (Injecto Rubber); John B. La Fontaine (Shell Chemical); Herman S. Ott (Ott Mold Engineering); and W. W. Witmond (Pacific Moulded Products).

A limited number of complimentary copies of Tlargi news will be sent monthly, with Tlargi board approval, to non-members directly connected with the rubber industry. Requests in writing were to have been received before February 2 by vice-chairman, Milt Churchill, c/o Naugatuck Chemical Division of the U. S. Rubber Co., 5901 Telegraph Road, Los Angeles, Calif.

► Plans for the construction of a plant near Long Beach, California, to produce vinyl resins and compounds, were announced recently by B. F. Goodrich Chemical Co., Cleveland, Ohio. According to the company, construction on the new plant is already underway and completion is scheduled during the second quarter of 1960. The plant will become the seventh domestic manufacturing facility of Goodrich Chemical and its first plant west of the Mississippi River. John R. Hoover, president of Goodrich Chemical, states that this new facility will enable the company to better serve the needs of the growing West Coast market. As the use of Geon vinyls continues to spread into new areas of industrial and consumer usage, it has become necessary not only to expand productive facilities but to diversify geographically, according to Mr. Hoover.

Tire Prices Increased On Industry-Wide Basis

► An industry-wide increase of three to five per cent on several lines of tires and tubes was initiated on February 10 by the Goodyear Tire & Rubber Co. Goodyear and other rubber companies cited increased costs in natural rubber, wages, chemicals and materials as the reason for the price boosts. Goodyear raised replacement tire prices three per cent on certain of its passenger tire lines and from three to five per cent on most truck tires. Other increases were three per cent on farm and implement tires; three per cent on industrial and pneumatic tires and tubes; and five per cent on truck tubes in larger sizes. Excluded from the price boost was the third line nylon tire which Goodyear brought out February 1 and the 570 x 15 third line rayon tire.

Goodyear's action was followed by the U. S. Rubber Co. and the Firestone Tire & Rubber Co. U. S. Rubber stated that it would increase prices of some passenger car replacement tires by three per cent; truck tires five per cent; farm and industrial pneumatic tires and tubes, three per cent; and large truck tire tubes, five per cent. At Firestone, passenger, bicycle, pneumatic, industrial, farm and implement tires and truck tires of 7.50 cross-section and smaller were raised three per cent. Larger truck tires, steel cord and off-the-road tires and larger tubes were increased by five per cent. Unchanged in price were Firestone's new economy priced nylon passenger tires, solid, aircraft and racing tires and passenger, motorcycle, tractor, racing and smaller truck inner tubes.

Other Firms Follow Suit

Goodrich Tire and Rubber Co. took similar action on February 15, followed by General Tire and Rubber Co. and the Mohawk Rubber Co. General Tire effected an increase of three per cent on most passenger tires, most truck tires of 7.50 cross-section and smaller, all industrial pneumatic tires and tubes and all farm tractor and implement tires. Prices of most truck tires and tubes of 8.25 cross-section and larger were raised five per cent. Prices of passenger tire tubes, truck tire tubes of 7.50 cross-section and smaller, farm tractor and implement tubes and industrial solids remained unchanged.

At the Dayton Rubber Co., passenger car tires, small truck tires and farm implement and industrial tires were increased by approximately five per cent. No changes were made on passenger car, small truck and farm tubes. Seiberling Rubber Co. price increases ranged from three per cent on most lines of passenger tires to five per cent on large truck tires and tubes. Prices of the company's premium priced puncture-sealing tires were increased 7½ per cent.

General Tire Awarded Injunction

► A California federal court, in a precedent-setting move, has stopped a California tire retreading company from duplicating the tread design of the General Dual 90, a tire produced and marketed by General Tire & Rubber Co., Akron, Ohio. In granting an injunction against Bay Tire Service, the U. S. District Court for the Southern District of California held that Bay Tire Service, in producing and selling a retreaded tire having a tread design similar to that of General Tire's Dual 90, had committed acts of unfair competition.

The court ruled that the public had come to identify the Dual 90, because of its distinctive tread pattern and widespread advertising, with General Tire & Rubber Co. The sale of imitations of the Dual 90, said the court, tended to dilute the good will built up by General Tire because such imitations were misleading as far as both the visual appearance and the inherent and invisible structural qualities of the tire were concerned. Earlier, a number of other companies in Southern California had signed consent decrees which prohibited them from making and selling retreading matrices or retreaded tires which imitated the tread of the Dual 90.

Wagmight Missile Project Probed

► The House Committee on Science and Astronautics has called U. S. Navy and Goodyear Aircraft Corp. officials to testify on the ill-fated Wagmight rubberized inflatable missile project. The Navy recently cancelled further development work in the Wagmight project, which, if perfected, would have permitted objects of rubberized fabric to be used for the bodies of jet airplanes or guided missiles. It was believed that they would have been much more compact and mobile than the metallic equipment and might have cost much less. Reportedly, the project caused a fierce internal Navy struggle.

A spokesman for the committee said congressmen want to discover why the Navy is not continuing research and development. He said the committee is also sifting reports that the Navy will not give Goodyear its blessing to proceed with the project at its own expense. Adm. Arleigh Burke, chief of Naval operations, stated that the Navy is still interested in the revolutionary rubber project, although development work has stopped.

Acme Backing Moves Division

► Industrial Products Division of Acme Backing Corp. has been moved from the mill in St. Louis, Mo., to the general offices of Acme in Stamford, Conn. Coated and laminated industrial fabrics made in the St. Louis plant will continue to be processed there. Sales activities will be carried on from Stamford.

Approves Bicycle Tire Tax Cut

► The House of Representatives has approved by a voice vote a Treasury-opposed measure that would remove the tax from tires and tubes used in the manufacture of bicycles. The tax would continue to apply to tires and tubes sold as replacements for the originals. There is a tax of 5c a pound on the tires and 9c a pound on the tubes applying to sales by manufacturers, producers or importers. However, the taxes do not apply to tires and tubes on bicycles shipped into the United States.

The Treasury opposed the measure, which would cost it slightly more than $500,000 in annual revenue, before the House Ways and Means Committee last year. The measure would cut about 25c off the cost of producing American bicycles and it is believed that manufacturers could use the saving to cut prices. An opponent of the measure complained that its backers were misrepresenting it as a boon to consumers.

Crown Plans Foam Products Unit

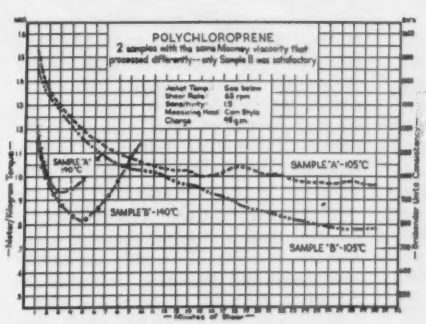
► Crown Rubber Co., Fremont, Ohio, will build a new plant north of Fremont to quadruple production of foam products. Know-how purchased from Europe will permit the company to handle 13 foot material "with the fastest throughput rate in the U. S."

Establishes Chemical Division

► Rexall Drug and Chemical Co., Los Angeles, Calif., has established a new chemical division with Ralph M. Knight, formerly vice-president and polyethylene manager of National Distillers Corp., serving as president. Associated with E. I. du Pont de Nemours from 1939 to 1952, Mr. Knight aided in the process design of DuPont's first polyethylene plant at Belle, West Va., and later directed its operation. John R. Provo, formerly division superintendent of polyethylene manufacture for DuPont, was named vice-president in charge of production for the new Rexall Chemical Division. Both men will maintain offices at company headquarters in Los Angeles.

Promoted by Allied Chemical

► William S. Burriack has been appointed to the position of chemical sales representative in the Buffalo-Pittsburgh area for the Plastics and Coal Chemicals Division of Allied Chemical Corp., New York, N. Y. Mr. Burriack, who received a B. S. degree from New York University in 1953, recently acquired an M. B. A. from the Graduate School of Business, Columbia University. Formerly associated with International Nickel, he has been in Allied Chemical's sales training program.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2 samples with the same Mooney viscosity that processed differently—only Sample B was satisfactory
SAMPLE 'A' 110°C
SAMPLE 'B'-140°C
SAMPLE 'A'-105°C
SAMPLE 'B'-105°C

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Canadian News

► Officials of the Canadian rubber industry forecast that the year 1960 is expected to produce higher results for the industry as a whole in the demand for rubber products. R. V. Yohe, president of B. F. Goodrich, Canada, Ltd., states that 1960 could be the best year in Canadian economic history and the Canadian rubber industry would perform a little better than the economy as a whole. Mr. Yohe cited the continuing increase of cars on the road and the increased use of rubber products in capital expansion of basic industries as prime factors in forming his 1960 forecast.

T. M. Mayberry, president of Firestone Tire and Rubber Co. of Canada, remarks that, traditionally, the rubber industry had kept pace with Canada's economic activity, and the 1960 outlook appears extremely favorable. According to E. R. Rowzee, president of Polymer Corp., the outlook for 1960 at the present time appears better than the same outlook a year ago. He states that the boom in Europe should be a positive factor in the Canadian export situation, but since international trade involved two-way movement, strong economic pressures for the importation of foreign goods would also be created.

James R. Anderson, president of Dunlop Canada Ltd., reports that with the advent of compact automobiles and the steadily increasing vehicle population in Canada, 1960 should be an even better volume year for the tire industry than 1959, which itself was a record year for tires. L. E. Spencer, president and general manager of Goodyear Tire and Rubber Co. of Canada, says that the current momentum of business indicates that a much higher and even new record level of the business upswing would be reached in the first two quarters of 1960. He estimates, that for the year as a whole, the gross national production may reach as high as $40 billion.

► Expenditures of $6.1 million are anticipated in the 1960 capital budget of Polymer Corp. Ltd., Sarnia, Ontario. The company reports that the budget reflects a generally optimistic economic outlook, both in Canada and abroad, with continuing growth in consumption of rubber of all types. It provides for facilities to maintain the firm's prominent position in the highly competitive synthetic rubber industry, the company states. Of the total budget, all of which will be realized out of the company's operations, $4.7 million are provided for capital items related to improvement of production units, and the continuance of work in the program of solution polymers and specialty types of rubbers. Included also is provision for regular, planned extension of employe facilities, and further work in connection with the prevention of air and water pollution. A sum of $1.4 million is carried forward for completion of projects started in previous years.

According to Polymer, the budget is based on the expectation that the company will operate at maximum capacity during 1960. To meet a strong demand for specialty rubbers, particularly in the export market, which represents a large and important segment of its business, increased production of these specialties as a proportion of total output is anticipated, the company states.

► According to latest reports, Canadian synthetic rubber is booming in a buoyant world market. Canada's Crown-owned rubber producer, Polymer Corp., is working at capacity and expects to maintain the pace throughout 1960. Export demand is brisk, accounting for 65 to 70 per cent of the total output from the Sarnia, Ontario, plant. It has been estimated that dollar income in 1960 will exceed the peak $75 million figure established in 1958, when the output reached 130,000 tons. The world demand for new rubber is increasing at record rates. In 1959 the demand jumped an estimated 14 per cent, and the outlook for 1960 predicts a further 10 per cent gain.

The Polymer Corp. reports that it has been able to hold its share of world markets in spite of steadily expanding manufacturing facilities in overseas countries, such as Japan and Holland, both putting new plants into production in 1960. It is reported that Polymer has a foothold in the new synthetic rubber-natural rubber field and these rubbers look like the product of the future. A market debut of these rubbers is expected in mid-1960. According to reports, Polymer will produce small quantities of polybutadiene types of rubber this year from a new pilot plant at Sarnia.

Polymer has also announced that the company recently organized a new staff group within the Marketing Division of the company. The group will be under the direction of E. E. Gale. who will report to R. E. Hatch, vice-president, marketing. H. A. Pfisterer, previously supervisor of the Rubber Technical Service Laboratory, has been transferred to the new group and will be responsible to Mr. Gale for specific technical aspects of product development and evaluation. According to Polymer, in line with its efforts to strengthen its over-all position in synthetic rubber and related fields, the new organization will be responsible for all marketing aspects of new product planning and development and the maintenance of a continuing liaison between the Marketing and Research & Development Divisions. In addition, the new group will handle specific projects of a staff nature within the Marketing Division.

Albert Loses $2.4 Million Suit

► Judgment for $2,416,000 was granted recently to the Harry Herskowitz Foundation of New York in Common Pleas Court against Machinery Terminals Co., owner of the key property in financier Sydney L. Albert's operations. The move was seen as the preliminary step in foreclosure action against the Machinery Terminals plant at 258 Kenmore Blvd., Akron, Ohio. Sheriff's sale of the property will follow foreclosure, court officials said.

Attorney Robert D. Moss, appointed receiver for the MT properties, said the Herskowitz Foundation holds the loan which started Mr. Albert on this financial rise. The Herskowitz Foundation was assigned the loan by the Winfield Baird Foundation in New York, original lenders of Mr. Albert's first big loan. It was for $1,900,000 in 1953. To obtain the loan, Mr. Albert gave a mortgage on the Kenmore Blvd. property. The mortgage later was assigned to the Herskowitz Foundation in 1956.

Export Controls Revised

► The Bureau of Foreign Commerce has eased export controls over some commodities and tightened those over others. Effective January 21, BFC added some 160 commodities to the list of goods which may be shipped to Hong Kong and Macao under general license GHK. Among the commodities which may now be shipped to Hong Kong and Macao without applying for individual licenses are certain rubber and rubber manufactures, such as piece goods of synthetic rubber, soles and soling, druggists' and medical rubber sundries, farm tractor and implement tires.

Simplex Wire Expanding

► Simplex Wire and Cable Co., Cambridge, Mass., has begun a modernization and expansion program, the first phase of which involves spending about $3 million for a new 100,000 square foot manufacturing building at the present Cambridge plant site. Simplex also has a submarine Cable Division at Newington, N. H.

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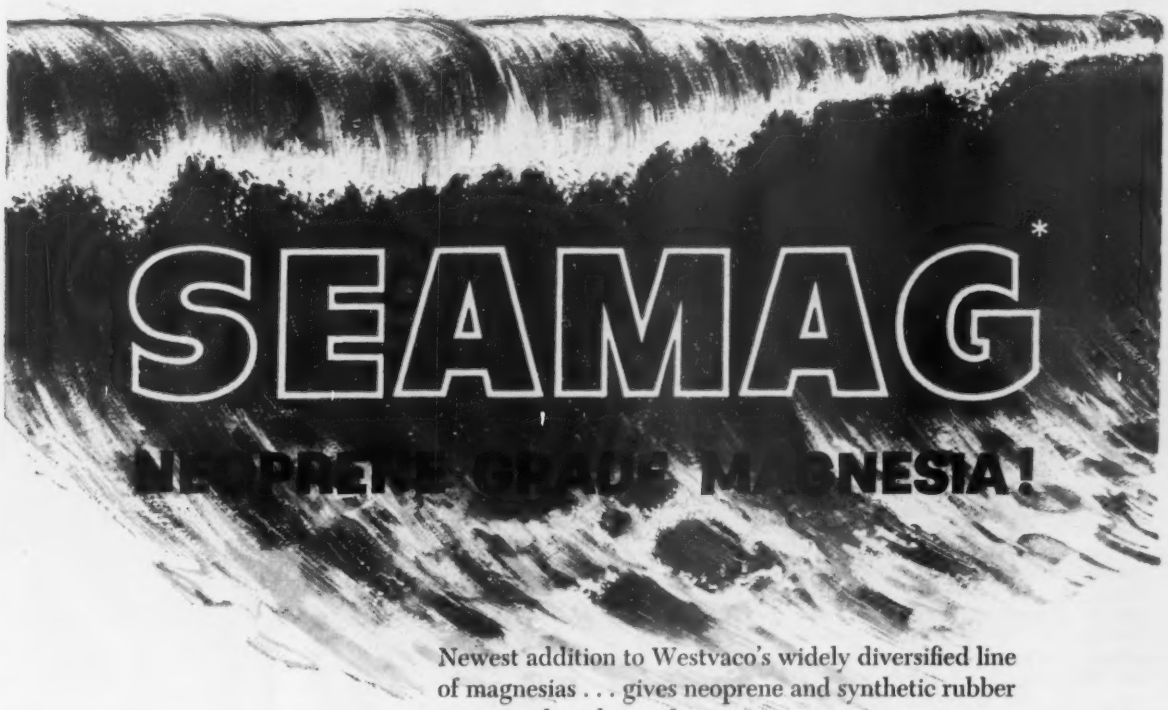

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Obituaries

C. R. Conklin

► C. R. Conklin, general sales manager of the Republic Rubber Division of Lee Rubber & Tire Corp., died on November 3 in Chicago, Ill. He was 63 years old. Mr. Conklin, a native of Prospect Park, Penna., studied mechanical engineering at Drexel Institute. During World War I, he served with the U. S. Army. Prior to joining Lee Tire, Mr. Conklin had been associated with U. S. Rubber Co. and Crandall Packing Co. During World War II, he was located in Washington, D. C., as a special representative for Republic Rubber, and subsequently became eastern district manager with headquarters in Philadelphia, Penna. In 1958, he transferred to Youngstown, Ohio, as assistant sales manager, and later that year was appointed general sales manager. He was a member of the Washington Rubber Group. Mr. Conklin is survived by his wife, a son and a daughter.

Robert L. Reynolds

► Robert L. Reynolds, director of sales of the Plastics and Coal Chemicals Division of Allied Chemical Corp., died on January 11 in New York City. He was 41 years old. A graduate of Brown University, Mr. Reynolds joined the Solvay Process Division of Allied Chemical in 1940. In 1942 he became affiliated with the chemical Division of the War Production Board in Washington, D. C., and in 1943 he joined the U. S. Navy as an ammunition shipping officer. After the war, he became a field sales representative for Solvay in Detroit and later in Philadelphia. In 1957 he was appointed assistant director of sales for the Solvay Division, and in 1959, he was named director of sales of the Plastics and Coal Chemicals Division. He is survived by his wife and two daughters.

Lester J. Richards

► Lester J. Richards, retired director of engineering for Dow Chemical Co., Midland, Mich., died at his home in Midland on November 2. He was 66 years old. Mr. Richards joined Dow in 1917 following his graduation from the University of Michigan with a B.S. degree in mechanical engineering. He served successively as a draftsman and chief draftsman and became chief engineer at the Midland operation in 1934. He was appointed director of engineering in 1950. Mr. Richards was a member of the American Society of Mechanical Engineers and the National Society of Professional Engineers. He is survived by his wife, two daughters and a son.

Frank C. Rowley

► Frank C. Rowley, product manager for molding compounds at Durez Plastics Division of Hooker Chemical Corp., North Tonawanda, N. Y., died on January 7 at Roswell Memorial Hospital in Buffalo, N. Y. He was 54 years old. Mr. Rowley was a 1928 graduate of Williams College. He joined Hooker Chemical in 1936 as a sales engineer in the Chicago district where he remained until 1950. He then went to North Tonawanda as assistant sales manager, molding compounds, becoming sales manager, molding compounds, in 1955, prior to the merger of Durez into Hooker. Mr. Rowley was a member of the Society of Plastics Engineers and the Society of the Plastics Industry. He is survived by his wife, a son and two stepsons.

Ernest A. Ulbrich

► Ernest A. Ulbrich, assistant director of purchases for the General Cable Corp., New York, N. Y., died on January 25 after a lingering illness. Mr. Ulbrich was born in Newark, N. J., and was educated in the Newark schools. He began his career with the A. A. Wire Co., which became a part of General Cable when that company was organized in 1927. After a number of years in purchasing work at General Cable's Perth Amboy plant, Mr. Ulbrich was transferred to New York, where he was assistant director of purchases. He is survived by two daughters.

Roy J. Devereaux

► Roy J. Devereaux, retired special representative for B. F. Goodrich Co., died on January 28 at Washington Hospital Center, Washington, D. C. He was 66 years old. A native of Clinton, Mass., Mr. Devereaux joined Goodrich in 1914 in Providence, R. I., and held various executive sales positions in Akron, Buffalo, Cleveland and Canada. He retired on January 31, 1959. He was a member of the Washington Rubber Group, serving as the group's first vice-president and second president. He is survived by his wife and a son.

Charles C. Trommer

► Charles C. Trommer, purchasing agent for the National Rubber Machinery Co., Akron, Ohio, died on February 2 at City Hospital in Akron, Ohio. He was 62 years old. Mr. Trommer had been with National Rubber Machinery since 1950. He is survived by his wife, five sons and two daughters.

Errett M. Grable

► Errett M. Grable, chairman of the board of Rubbermaid Inc., and retired president of Wear-Ever, Inc., died on December 28 at his home in Pittsburgh, Penna. He was 70 years of age. Born at Newton Falls, Ohio, in 1889, Mr. Grable attended Hiram College and Stetson University. He joined Aluminum Co. of America in 1909 as a Wear-Ever specialties sales representative. He subsequently served in supervisory capacities in Wear-Ever's Cincinnati, Rochester, N. Y., Minneapolis, and Chicago district sales offices, before being elected vice-president in charge of sales in 1933. In 1934, Mr. Grable was joined by James R. Caldwell and Horatio B. Ebert in reorganizing the old Wooster Rubber Co. and changing its line of manufacturing from balloons to rubber housewares developed by Mr. Caldwell. Mr. Grable was elected chairman of the Rubbermaid board in 1941. He is survived by his wife and two daughters.

Lewis Pokras

► Dr. Lewis Pokras, associate professor of chemistry at the Polytechnic Institute of Brooklyn, died on December 24 at the Long Island Jewish Hospital in New Hyde Park, N. Y. He was 43 years old. Dr. Pokras graduated from the University of Chicago in 1938 with a B.S. degree. He received his M.S. degree from the same institution in 1948. In 1952 he obtained his Ph.D degree from the Illinois Institute of Technology. In 1939, Dr. Pokras was an assistant examiner for the Illinois Civil Service Commission, and later taught chemistry at several Midwest schools. He joined the faculty of Brooklyn Polytechnic in1954. Dr. Pokras was a member of the American Chemical Society. He is survived by his wife and a son.

Ralph C. Feigles

► Ralph Clifton Feigles, works manager for Sprout, Waldron & Co., Muncy, Penna., died on December 13 in Muncy. He was 50 years of age. Mr. Feigles joined Sprout, Waldron in 1928, worked his way through a series of increasing responsibilities, and was appointed works manager in 1938. He served as a member of the company's Executive Committee, and was a member of the American Foundryman's Association. He is survived by his wife, two sons and a daughter.

Josiah M. Cook

► Josiah M. Cook, manager of industrial product sales for American Hard Rubber Co., Butler, N. J., died on January 6 at his home in East Orange, N. J. He was 63 years of age. Mr. Cook joined American Hard Rubber in 1924, and was named manager of industrial product sales in 1947. He is survived by his wife.

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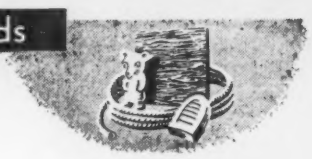

Urethane Foam Pipe Insulation

► Fibrous Products Division, Union Asbestos & Rubber Co., Bloomington, Ill., has developed a light-weight, rigid, urethane foam pipe insulation. Designated Unarco U-200, the insulation has been designed for use at temperatures ranging from —300° to +220°F. The manufacturer reports that recent tests reveal that U-200 has a K factor of only 0.14 at 70°F., the lowest known for a commercially available product of its type. In addition, the insulation has a density of 2.3 pounds per cubic foot, yet it has high compressive strength, the company states. According to the manufacturer, U-200 is not affected by most mastics and sealers normally used for cold insulation; it is self-extinguishing; has no capillarity; and water absorption is very low. The product is reported to be non-toxic and non-irritating and can be cut to size and shape quickly and easily with simple hand tools. It is available in accurate, half-round sections, 36 inches long, or in block form.

Dayton Wrap-Around Press Blanket

► A wrap-around press blanket for use in newly developed rotary letterpress application has been announced by Dayton Industrial Products Co., Melrose Park, Ill. The company reports that the new blanket is an integral part of a new concept in letterpress operations which permits higher press speeds and substantial reduction in make-ready time using new wrap-around letterpress plates and direct-paper printing. Dayton's blanket uses a special rubber-vinyl-resin face compound for superior ink receptivity and low swell. Increased face thickness, higher than normal press blankets, and stabilized blending of the new compound, help control uniform blanket inking action on the rotary cylinder of new presses, the company states. In addition, the new blanket face also offers high resistance to ozone, heat, oil and grease, and abrasion.

Asbestos Gasket Tape

► The lattice structure of a double-seal, asbestos gasket tape, introduced by Union Asbestos & Rubber Co., Bloomington, Ill., permits double gasketing around bolts and studs in one operation. The new line of tape is available in wide lattices for large bolts, as well as in weaves to provide smaller bolt space openings. Both wire inserted and non-metallic tapes in a wide variety of sizes, either plain or graphite coated, can be supplied.

Foamatic Lounge Pad

► Automatically adjusted comfort, tailored to individual needs, is reported to be the unique feature of the new Foamatic lounge pad manufactured by Holiday Line, Inc., 50 Washington Street, Brooklyn, N. Y. The comfort feature is obtained through a combination of plastic foam and air in a patented arrangement. The pad is equipped with a small valve which permits individual adjustment of buoyancy. When the valve is opened, body pressure forces air out, and when the desired degree of softness is reached it can be maintained merely by closing the valve. Increased buoyancy is obtained merely by opening the valve and allowing the air to return automatically.

Made with Velon vinyl sheeting, a product of the Firestone Plastics Co., Pottstown, Penna., the Foamatic pad is not affected by weather or even immersion in water, the company states, since Velon is completely waterproof as well as resistant to the effects of sun, mold and mildew. In addition, the pad is electronically heat sealed, which means that there are no stitches to break or deteriorate from exposure. The pad is available in three types—all Velon; Velon on one side and Velon-laminated cotton cloth on the other; Velon-laminated cotton cloth on both sides. It comes in two printed patterns: a multicolored floral and a marine design, as well as in solid colors.

Vinyl-Cork Floor Covering

► A combination vinyl-cork floor covering has been developed by Vinylkork A/S, Tistrup, Denmark. According to the company, vinyl-cork has the wear resistance of vinyl and the insulating properties of cork. It is manufactured in tiles of 9.8425 x 9.8425 inches, in light and dark natural cork color with a luster surface. It is also available in strips of 1.1811 x 9.8425 inches, used for making attractive floor designs.

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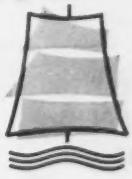

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Dur-A-Lift Conveyor Belt

► Dur-A-Lift, a new incline conveyor belt is now being marketed by the Boston Woven Hose & Rubber Co., Cambridge, Mass. The company recommends the belt for carrying objects up an incline as steep as 45° to 50°. The belt will convey smooth, rough or slippery objects without sliding, the company states. The top cover of the belt consists of parallel, transverse, inverted "V" ridges of Dulon. According to Boston Woven Hose, Dulon covers make the Dur-A-Lift belt more resistant to abrasion, gouging, tearing and oxidation. The deep "V" ridges are self-cleaning and assure maximum grip action at all times. The belt is available in 3 or 4 ply 28-ounce duck, and is manufactured and stocked in 48-inch wide rolls, 500 feet long, but may be cut to other widths. The manufacturer states that Dur-A-Lift also can be produced in other constructions with molded edges, bottom cover and other fabrics up to 48 inches wide to specific order.

Goodyear Colored Fire Hose

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced the development of a colored fire hose. According to the company, standard colors will include red and yellow, as well as black and white, and the hose can be custom-colored to harmonize with specific decors. The company claims that the new hose, designated D-500, affords numerous advantages over conventional fire hose in addition to its decorative value: red for immediate identification of fire protection lines; yellow for poorly lighted areas such as mines; and black for use in locations where dark discoloring materials prevail. The colored hose is designed for service pressures up to 500 pounds per square inch, the company states.

Elastic Naugahyde Upholstery

► U.S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., has introduced a new line of elastic Naugahyde upholstery, called Kenya, with multi-bands in different values of the same color, correlated with solid decorative colors. The line has a shantung look with a slubbed texture. The company reports that the material will enable decorators, furniture manufacturers and upholsterers to combine solid colors and multi-shades of the same color for decorative effects. The vinyl upholstery comes in multi-bands of red, turquoise, espresso, mocha, marigold, opal white, russet, blue, antique gold and bronze olive. Solid colors are made in these ten shades as well as in white and in black. The material is elastic fabric backed and is 54 inches wide.

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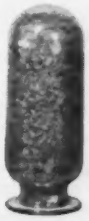

Type: Thermoplastic Hydrocarbon
Form: Flaked
Softening point (ball and ring): 210°—220°F.
Color (coal tar scale): 1½—2
Color (Gardner): 10-11
Color (Rosin scale): I—K
Acid No.: 0-2
Saponification No.: 0-2
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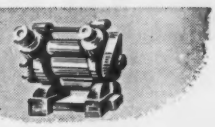


Wet Blast Unit

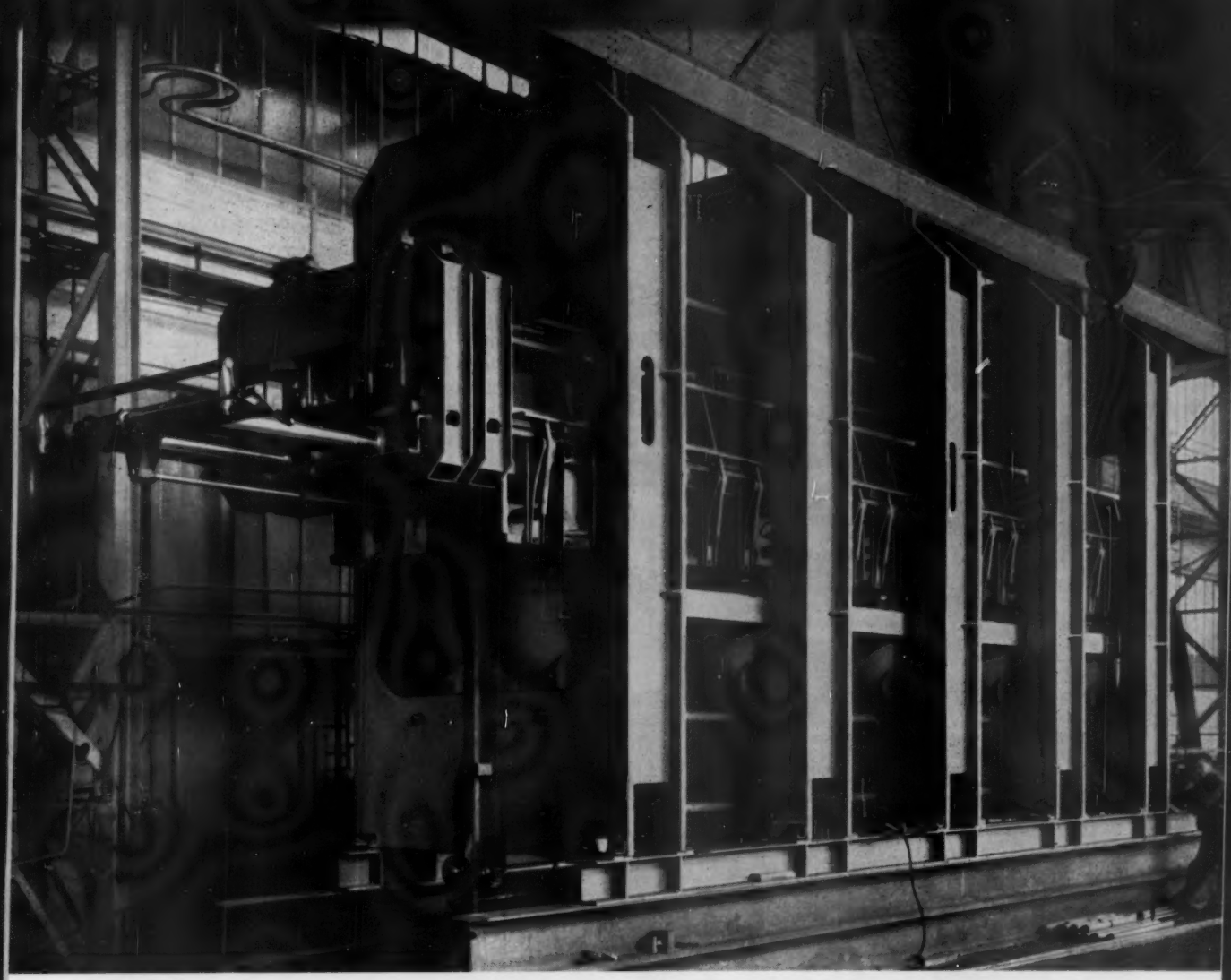
► A new wet blast unit, reported to be capable of operation from a "sitting-down" position, has been developed by Pressure Blast Mfg. Co., Inc., 27 Pleasant Street, Manchester, Conn. The unit, designated Consol-Matic, has been designed for the high production rate finishing of small parts such as eyeglass frames, cuff links, sparkplugs and vacuum tube leads, the company states. Two bays are provided at the operating station where work is loaded and unloaded. Moving blast guns, driven by air cylinders, are positioned at each bay. In operation, the operator places parts in either or both bays and depresses the foot lever. This begins movement and activation of the blast guns. A pre-set timer determines the length of blast time as well as the speed of gun oscillation. The design of the bays or parts allows for the use of masks if decorative effects are to be achieved, the company states. Positioning devices are provided for the blast finishing of parts and the guns are individually movable which adds to the flexibility of the unit.

According to the company, the Consol-Matic operates on the aspiration system which eliminates the need for a pumping mechanism in the blast circuit. Employing fine abrasives, up to 5000 mesh, the unit imparts fine, satin, chemically clean surfaces without heavy etching, stock removal or distortion, the company claims. Dimensions of the unit are 46 inches high, 24 inches wide and 34 inches deep. Weight is 130 pounds.

Bell-Mark Automatic Imprinter

► Bell-Mark Corp., 18 Ropes Place, Newark, N. J., has announced the development of an improved version of its automatic imprinter, which is reported to be based on suggestions made by tire manufacturers and other users in the rubber industry. The unit, called Model 3073 printing attachment, imprints with a sharp, indelible impression that is said to permit product identification throughout the entire rubber processing cycle. The company states that Model 3073 can be used as a replacement for existing equipment or new line set-ups. Lighter in weight than its predecessor, the new unit also features a newly-developed positive locking device for securing brass-backed printing plates, a larger ink fountain with auxiliary reservoir available, improved roller adjustment mechanism and a newly engineered form roller that permits more uniform distribution of ink, the company states.

According to Bell-Mark, Model 3073 is easily



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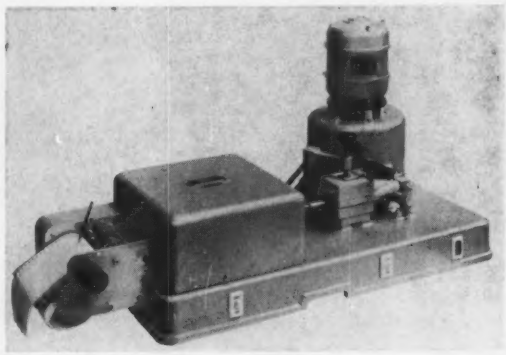
installed on production machinery from which it derives its power, and is usually installed at a point where the crude rubber is extruded from the tuber. Friction driven, Model 3073 imprints hot stock before it is immersed in a water bath, and imprints are made either on tire tread or camelback. Special attachments are available for imprinting ply stock or for other specialized rubber application, the company reports.

Wallace-Shawbury Curometer

► The Shawbury Curometer is an instrument which records the cure characteristics of rubber while vulcanization takes place. The machine, distributed by Testing Machines, Inc., 72 Jericho Turnpike, Mineola, L. I., N. Y., can also measure scorch time at any selected temperature. Cure results are provided quickly and the test is equivalent to the 300 per cent tensile modulus in estimating degree of cure. The results are permanently recorded on chart paper and they appear as a continuous curve, eliminating the need to estimate a curve through five or six points as in conventional tests, the company reports. In operation, a rotating eccentric imposes a dynamic shear stress on a rubber test specimen. During vulcanization, the dynamic stiffness of the rubber increases and the resulting reduction in strain is magnified and recorded. The machine consists of the eccentric, which is motor driven; two oil-heated platens, which house the test specimen between them; and a flat paddle which is sandwiched between two halves of the test specimen. The revolving eccentric is connected to the flat paddle through a spring mechanism. The eccentric applies a low frequency sinusoidal vibration of constant amplitude to the spring mechanism. As the specimen vulcanizes, its stiffness increases and the movement of the paddle decreases. This movement is magnified mechanically and recorded over a rotating drum.



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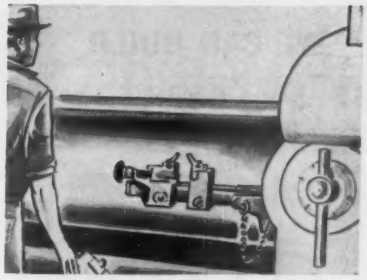

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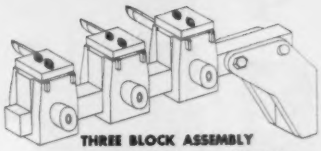

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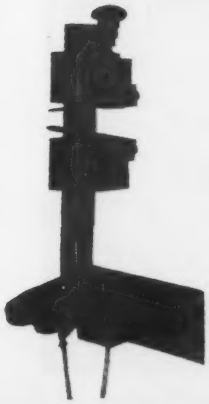
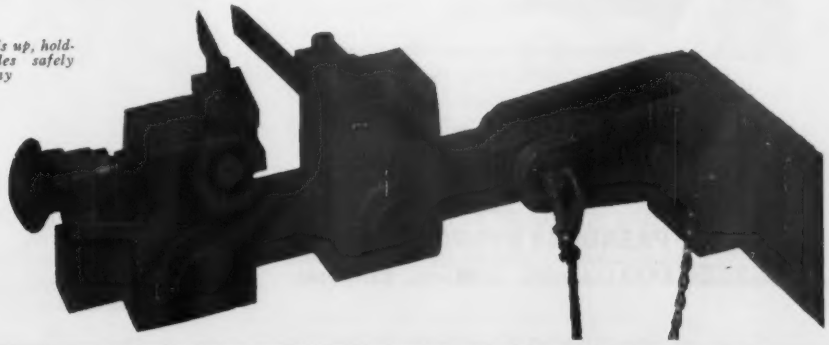


Unit folds up, holding blades safely out of way



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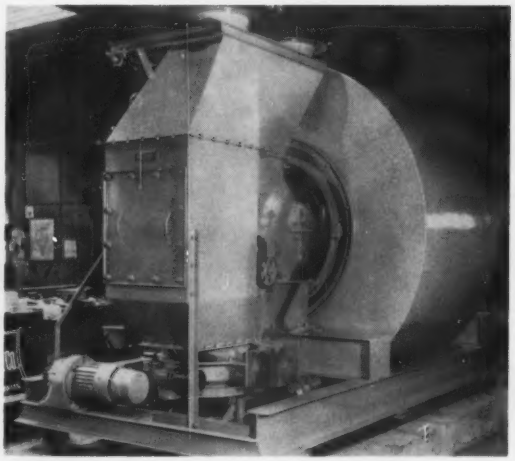

from intermixture with the blending materials until the appointed time. The rotary blender and hopper, manufactured by Sturtevant Mill Co., Dorchester, Boston 22, Mass., is available in capacities of from 500 pounds to 20 tons. The hopper capacity is variable. The company states that the multi-purpose units are dust-tight at all points, keeping their dust seals during filling, discharging and even while the blender is in transit. According to Sturtevant, since all moving parts and controls are either motor driven or cylinder actuated, the unit can fit into existing plants without requiring major adaptations, and the entire process can be controlled from one panel.

Rubber Cutting Machines

► According to Motch & Merryweather Machinery Co., 1250 East 222nd St., Cleveland 17, Ohio, its Wink high-speed rubber cutting machines have proven successful in providing high-speed cutting to very accurate dimensions and with controlled feed for such materials as rubber, soft plastics, impregnated fabrics, reinforced hose and fibers, in diameters up to three inches without distortion or collapse. The Wink machines are suited for precise cutting of extruded materials and may be incorporated easily into a completely automated extrusion line, the company states. In addition, for the smaller producer, it offers the advantage of practically complete automation in a single package.

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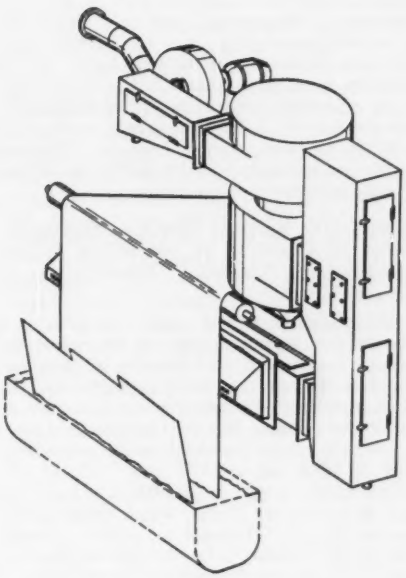

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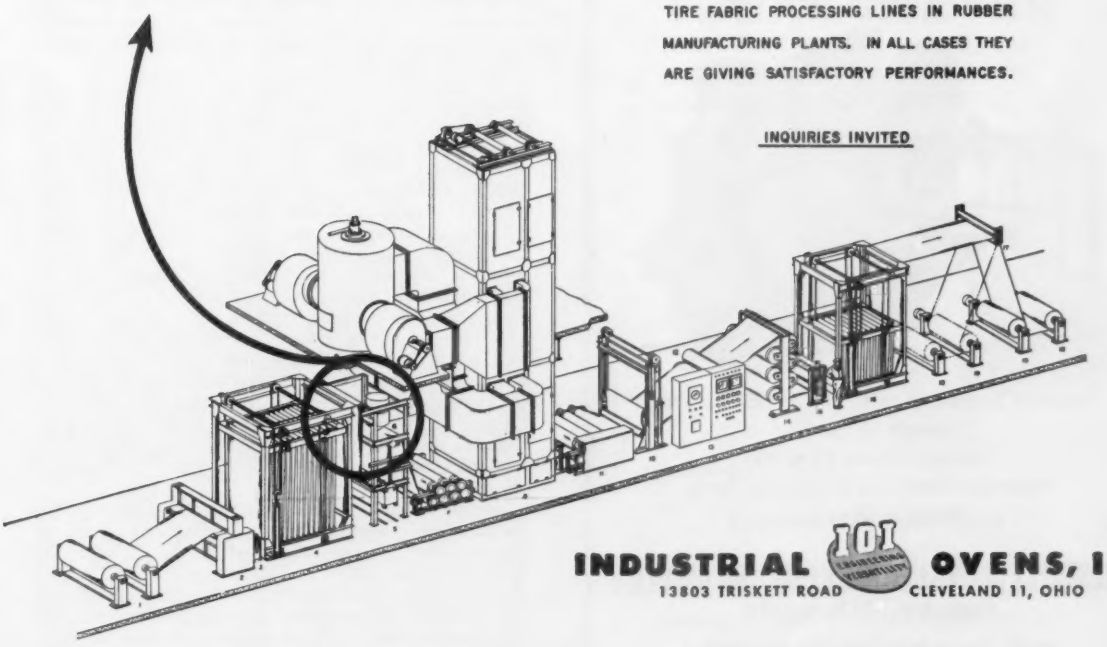

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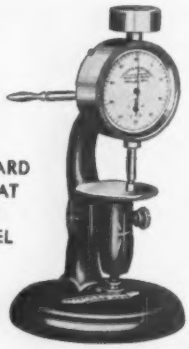

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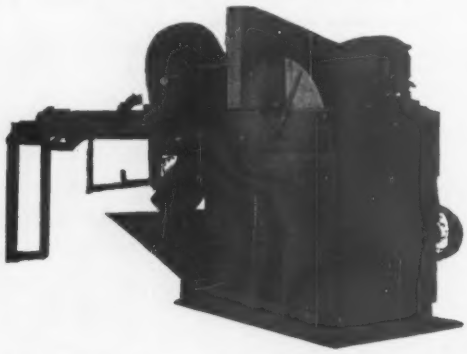

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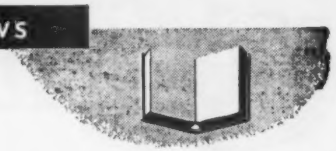
Reviews



Kautschuk-Handbuch (Rubber Handbook). Edited by S. Boström. Published by Berliner Union, Stuttgart, Germany. Four volumes, approximately 1500 pp., 6 x 9 in., DM 300 to 380.

The objectives of the planned four volumes are defined in the editor's foreword and the advertising leaflets of the publishers as an attempt to create a reference work for technologists and scientists working in the field of rubber and in neighboring fields, in a similar way as it was provided twenty-five years ago by Hauser's "Handbuch der gesamten Kautschuktechnologie." The publication of the work, it is pointed out, required eight years and the scientists contributing individual chapters numbered about forty. Below are given reviews of Volumes I and III, which have now appeared. The other two volumes are scheduled to be published during 1960, and will be reviewed when received.

Volume I—Die Rohstoffe (The Raw Materials). By S. Boström, M. Cherubim, W. von Haken, W. Hofmann, F. Kirchhof, R. Schlicht, P. Schneider, A. Schwarz, J. Uelpenich.

The introduction to this volume discusses in eighteen pages the economic importance of rubber for the world in general and for different countries in particular. Interesting facts brought out in this chapter are the sixty-fold increase in world consumption of rubber since the start of the century, and the division between natural and synthetic rubber produced, which was 9% synthetic rubber in 1938 and is 48% today. Almost all of the synthetic rubber produced in 1938, it is stated, was produced in the Soviet Union, which seems surprising if accurate. Chapters 1 through 4 deal with natural rubber: 32 pages are devoted to production of natural rubber; 33 pages to the physical properties of rubber, such as elasticity, thermal properties, optical properties, swelling phenomena, etc.; 25 pages to the behavior of rubber in an electrical field (synthetic rubbers are also discussed in this chapter), and 70 pages to the chemistry of rubber and rubber derivatives.

Chapter 5 (32 pages) discusses vulcanization and vulcanizing agents. Chapter 6 (10 pages) deals with classification, history and economic significance of synthetic rubber. Chapter 7 (36 pages) discusses production of monomers, butadiene, chlorobutadiene, styrene, acrylonitrile, isobutylene and 2-methyl-5-vinylpyridine. Chapter 8 (13 pages) deals with homopolymers. Chapter 9 (37 pages) discusses the neoprenes, including the German polychlorobutadiene types, Perbunan C. Chapter 10 (7 pages) is devoted to polyisobutylene. Chapter 11 (65 pages) deals with copolymers, discussing butadiene-styrene copolymers, oil-extended rubbers, high styrene resins, alfin rubbers, nitrile rubbers, copolymers of butadiene with other unsaturated monomers such as acrylic and methacrylic compounds and vinylipyridine, copolymers of chloroprene with other monomers and graft polymers. Chapter 12 (9 pages) is devoted to butyl rubber, polymers based on acrylic acid esters, and fluoro- and chloroethylene elastomers. Chapter 13 (20 pages) is devoted to chlorosulfonated polyethylene.

Volume I of the handbook is a valuable addition to the literature on rubber, giving an excellent review of the present status of knowledge, and of the chronological development of current manufacturing practices. American and European literature is extensively quoted and the similarity in operations is well documented. The American styrene rubber designations are used as prototypes for polymers; Buna Hüls 150 is pointed out to be equivalent to SBR 1500, Buna Hüls 152 to SBR 1502. In

the discussion of oil-extended rubber it is pointed out (page 362) that the first oil-extended rubber was produced in Germany in 1943-1945, under the names "Spargummi" and "Sparbuna" using Naftolen as an extender. The beneficial effect of free nitrogen bases in so-called highly aromatic oils is pointed out, as well as the importance of low content of saturated hydrocarbons.

The designations of present-day, German, oil-extended rubbers—Buna OP 25, OP 37.5 and OP 50—indicate the content of Naftolen, the amounts of which are the same as used here. The Italian-produced "Europran 1712" is also similar to American SBR 1712, containing 37.5 parts of highly aromatic oil as an extender. Commercially available types of nitrile rubber, it is pointed out, are not standardized in a comparable way to styrene rubbers, since they are independently named and produced by various manufacturers. Discussions of the other polymers are also quite comprehensive and well presented. The chapter on neoprene is particularly well written. Starting with the history of neoprene, it is noted that, in distinction to other polymers such as styrene rubbers, nitrile rubbers and butyl, which were originally developed in Germany, neoprene is unquestionably an American invention. The various neoprene types are then discussed, and compounding principles explained.

An outstanding feature of the book is that a great deal of information is presented in highly condensed form, which makes this handbook a valuable source for a quick review and first orientation on many problems. Nevertheless, the book is not a textbook for students to memorize for examinations, since some of the statements, if repeated verbatim, could flunk a student; e.g. the statement on page 100 that Perbunan, Thiokol, neoprene, PVC and Vulkollan are high molecular weight hydrocarbons. However, this and similar inaccurate wordings detract little from the value of the book.

F. R.

Volume III—Gummitechnologie (Rubber Technology). By E. Baschant, F. Berchelmann, E. Bobeth, S. Boström, M. Dewald, E. Enste, H. W. Kunth, E. Lassner, K. Naumann, C. Oeffner, M. Paur, H.-C. Rhiem.

Chapter 1 (117 pages) deals with tires and tubes; chapter 2 (41 pages) with industrial rubber goods, molded goods, hose and rolls; chapter 3 (5 pages) with rubber thread; chapter 4 (45 pages) with footwear; chapter 5 (18 pages) with playing balls and hollow articles; chapter 6 (14 pages) with cellular rubber; chapter 7 (33 pages) with wires and cables; chapter 8 (10 pages) with the manufacture of erasers, and chapter 9 (11 pages) with flooring.

The discussions presented, although they will strike some readers as incomplete, are in general adequate for the purposes of the book. The best chapters in this volume are the ones on tires, footwear and erasers. The photographs illustrating performance, wear and various stages of tire-stress, and the graphs presented in the mathematical treatment of wear and tire design, are excellent. They give a wealth of information not to be found in any other reference work. Tire designers will do well to study the material presented. The discussion of the tubeless tire is, however, somewhat amusing. On page 93 it is commented that the tubeless tire development is not to be taken seriously and should be considered a novelty intended as a sales gimmick. The Firestone design, featuring the tubeless safety tire with an inner air chamber, is mentioned on page 95 as representing a vote of non-confidence for this development. It must be assumed that this chapter was written early in the 8 years of preparation of the handbook. But, perhaps, the prophecies might still come true; there are many who put tubes in their tubeless tires.

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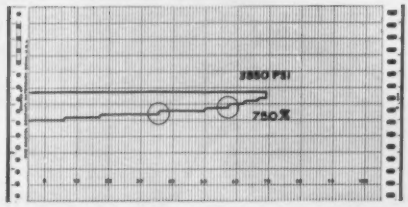

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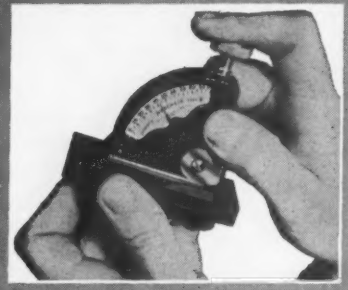

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REVIEWS (CONT'D)

Compounding recipes given are not the most modern ones. The type of compounds presented are, however, of rather little importance, since few manufacturers will seek this type of information in textbooks. One major shortcoming of volumes I and III is the absence of a subject index. It is hoped that volume IV will correct this by providing an index for all four volumes. The table of contents of Volume IV, as given in the publisher's advertising literature, however, does not list a subject index.

With the expectation that Volumes II and IV will be as informative and well written as the two published volumes, Boström's "Kautschuk-Handbuch" is highly recommended as a valuable addition to every library on rubber literature.

F. R.

BOOKLETS, CATALOGS, etc.

Alpex: the Cyclized Rubber in Protective Coatings. Alkydol Laboratories, Div. of Reichhold Chemicals, Inc., 3242 South 50th Ave., Cicero 50, Ill. 8½ x 11 in. 20 pp.

Applications and properties of a cyclized rubber for protective coatings are presented in this comprehensive brochure. The first section contains a thumbnail history of cyclorubber from the basic German research in 1938 to current techniques for converting natural rubber into a high melting, resinous substance with horn-like strength and hardness. A discussion of the product's paint technological properties explains the plasticizer combinations necessary for its utilization as a protective coating. Descriptive and statistical data are also offered on storage stability, film formation, solvent retention, pigmentation, thermoplasticity, weather resistance and electrical properties.

•

Tri-Homo Disperser-Homogenizer Particle Size Reduction Equipment. Tri-Homo Corp., 94-104 Highland Ave., Salem 1, Mass. 8½ x 11 in. 28 pp.

A complete line of particle size reduction equipment is described in this colorful brochure. The aspects of wet process homogenizing covered include grinding, dispersing, colloidal suspensoids, homogenizing, emulsifying and reducing the size of abrasive substances, minerals, pulps and solids. New design features are pointed out illustrating the adaptability of the equipment and its economical operation in reduction to the low micron or sub-micron range. Tables of specifications present data on dimensions, weight, power requirements and approximate production rates for both medium viscosity bases and heavy oil vehicles.

•

THE TMI Family of Universal Compression Testers. 6 pp. **Three Ways to Lose Money.** 4 pp. **National Forge Impact Testers for Plastics Ceramics.** 4 pp. Testing Machines, Inc., 72 Jericho Turnpike, Mineola, N. Y. 8½ x 11 in.

Three colorful brochures describe impact and compression testers, explaining their construction, applications and accessory equipment. The compression testers are recommended for more than 15 different applications. They perform squeeze, squash, bend, yank and jab tests. The impact tester is available for standard Izod and Charpy Tests on plastics and ceramics, as well as for a recently developed adhesive strength test. Methods listed conform to applicable ASTM Standards.

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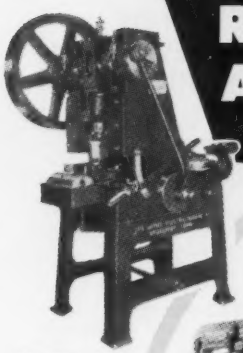

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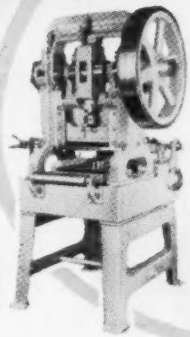
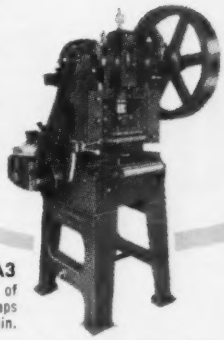


MODEL A2
Precision cutting for multiple heels, half and full soles with stock grain.



MODEL A3
Precision cutting of multiple heels and taps with or across stock grain.

Cutting on a Coulter is efficiency in action

Cutting speeds up to 15,000 pieces per hour boost your production while Coulter's job designed machines yield a low maintenance record

PRECISION RUBBER CUTTING MACHINES CUT WITH OR ACROSS STOCK GRAIN

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- Multiple heels and taps
- Half and full soles
- Mechanical rubber goods

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (February 1), the price of spot rubber on the New York Commodity Exchange has moved in a range of 250 points, high for the period being 41.00c reached on February 26 and 29, and low being 38.50c reached on February 8. The average price of spot rubber for the month of February was 39.33c compared with a price of 41.18c in the previous month.

Analysts at Merrill Lynch, Pierce, Fenner & Smith point out that for some six or seven weeks futures have been in an indecisive sideways trend. It seems, they believe, that vacillating world-wide economic sentiment may have more to do with this situation than lack of new incentive.

In this country, a creeping disenchantment with the economic outlook temporarily obscured the former forecasts of new records for 1960.

MLPFS notes that it is reasonable to conclude that the change in sentiment, together with tighter money, has tended to restrain both buyers and makers of rubber and rubber products. It is believed that these static rubber prices will eventually make a major, rather than a gradual, move.

Supplies Withheld

An outstanding characteristic of the present situation has been the accumulation and/or major withholding of supplies at Singapore, MLPFS reports. For some time that has been a holding action of some magnitude. Imports into Singapore have been average and the take-off just sufficient to preclude any real pressure to sell.

Though Indonesia may be the exception to the holding action, the collection rate there has been held in check and is not believed to have increased as is expected in a high price period.

It is thought that supplies have been withheld, especially in Singapore, in the belief that Russia and China would re-enter the market for appreciable purchases in the near future. There have been rumors that Khrushchev's visit to Indonesia may spark a rubber deal with that country.

Natural rubber has also been affected by the slowdown in the automotive industry and the general cautious tone throughout all industry. The automobile industry now expects, for example, that between 1.9 and 2.1 million cars will be produced in the first quarter of the current year. Earlier estimates had placed automobile production at close to 2.5 million units. Dealer inventories are beginning to accumulate and are now near 900,000 units, some 300,000 units more than at the end of last year.

Any severe cutback in automobile production for 1960 would have a major effect on the natural rubber market, particularly in view of the current price situation.

NEW YORK, MARCH 1, 1960

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM FEB. 1 TO FEB. 29

Feb.	Spot	Mar.	May	July	Sales
1	40.25	40.15	39.35	38.75	34
2	40.25	40.00	39.30	38.70	19
3	39.75	39.50	39.15	38.35	53
4	39.50	39.30	38.80	38.30	102
5	38.88	38.85	38.10	37.60	146
6	....	....	....	....	...
7	....	....	....	....	...
8	38.50	38.35	37.60	37.20	106
9	39.25	38.99	38.30	37.75	68
10	39.25	39.00	38.40	37.75	75
11	39.13	38.80	38.37	37.70	58
12	39.00	38.66	38.26	37.60	25
13	....	....	....	....	...
14	....	....	....	....	...
15	39.13	39.00	38.40	37.85	44
16	40.13	40.00	39.20	38.70	186
17	39.50	39.45	38.75	38.10	13
18	39.75	39.60	38.90	38.40	5
19	39.88	39.80	39.10	38.60	40
20	....	....	....	....	...
21	....	....	....	....	...
22	....	....	....	....	...
23	40.00	39.80	39.35	38.65	19
24	40.75	40.65	39.70	39.00	108
25	40.75	40.75	40.15	39.25	66
26	41.00	40.90	40.10	39.00	33
27	....	....	....	....	...
28	....	....	....	....	...
29	41.00	41.00	40.00	39.00	25

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.41
Apr.	.40½
July-Sept.	.39
Thin Latex Crepe:	
Spot	.47¼
Thin Brown Crepe, No. 2	.41⅜
Flat Bark Crepe	.37¼

London Market
(Standard Smoked Sheets)

Apr.-June	39.58 — 39.72
July-Sept.	38.41 — 38.55

Singapore Market
(Standard Smoked Sheets)

Apr.	38.63 — 38.72

Middling Upland Quotation

	Jan. 29	Feb. 29		
	Close	High	Low	Close
Mar.	33.12	33.03	33.02	33.03
May	33.23	33.08	33.08	33.07
July	32.80	32.61	32.61	32.61

Notes & Quotes

L. E. Spencer, president and general manager of the Goodyear Tire and Rubber Co. of Canada, recently stated that the current momentum of Canadian business indicates that in the first two quarters of 1960, a much higher record level of the business upswing will be reached. For the year as a whole, he estimated, the gross national product may reach as high as $40 billion.

Synthetic Rubber

The synthetic rubber industry established another new production record in January with an output of 132,684 long tons. The previous high, set in October, 1959, was 128,532 long tons. A total of 95,767 long tons of synthetic rubber was consumed in January of this year, accounting for 67.19 per cent of total new rubber use.

It is currently expected that 1.1 million long tons of all types of synthetic rubber will be consumed in the United States during 1960. In order to hit this mark, monthly consumption of synthetic rubber would have to average about 95,000 long tons. While January hit this figure and February is likely to do so, some doubts have now begun to appear as to whether this pace will be maintained throughout the year.

Of course, it is much too early to tell with any degree of certainty what trends indicate. It must be reported, however, that an almost indiscernible slow-down seems to be in progress throughout all industry.

Shifting Sentiments?

There are small sentiments that 1960 may not turn out to be the "cracker-jack" year that all expected only a few weeks back. If the over-all consumption of new rubber does not meet earlier estimates in 1960, synthetic rubber will probably suffer less than natural.

For one thing, synthetic rubber enjoys a relatively stable price. This is an inestimable virtue in the minds of many purchasing agents and management, in general, welcomes price stability. It may very well be that if the over-all consumption pace falls off, synthetic rubber will make even greater proportionate gains. That is to say, if 1960 turns out to be a 1.5 million long ton consumption year rather than a 1.62 or 1.65 million long ton year, synthetic rubber may account for close to 70 per cent of the total.

What with the increasing ability of the Free World to produce synthetic rubber, it is likely that U. S. exports will fall below the 280,000 long tons exported in 1959. If this situation does materialize, the synthetic rubber industry may have still another problem.

Temporary Difficulties

There should be no inclination to maximize these difficulties, however. As far as the synthetic rubber industry is concerned, these factors of which we have been speaking are in the nature of temporary, short-term duration.

In balance, the synthetic rubber industry is in an admirable position. Its ratio use keeps climbing. Per capita consumption of new rubber is on the rise throughout the world. In the United States itself, population increases alone indicate growing markets.

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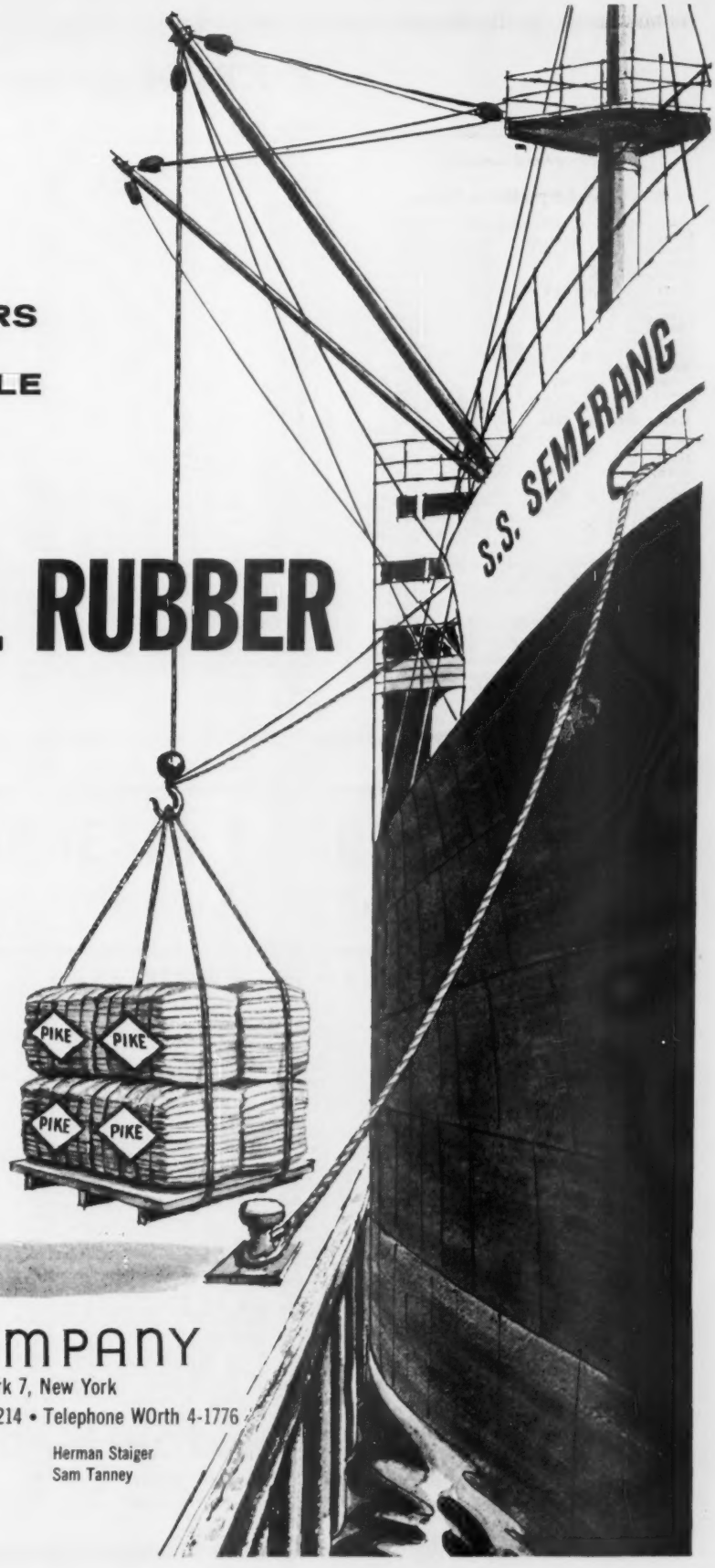

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SALES DIVISION: Sidney J. Pike, George Steinbach, George Jatinen, Herman Staiger, Sam Tanney

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900
Butaprene NH	.6500
Butaprene NL	.5000
Butaprene NXM	.5800
Chemigum N1NS	.6400
Chemigum N3NS and N5	.5800
Chemigum N6	.5000
Chemigum N6B	.5000
Chemigum N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
Hycar 1001 and 1041	.5800
Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
Hycar 1441	.6200
Paracril AJ	.4850
Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.5900
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803	.5000

Butadiene-Styrene Types

Ameripol 1000	.2410
Ameripol 1001	.2410
Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 1805	.1550
Ameripol 4600	.2410
Ameripol 4650	.1820
Ameripol 4651	.1770
Ameripol 4652	.1425
Ameripol 4654	.1870
Ameripol 4655	.1820
Ameripol 4700	.1750
Ameripol 4750	.1545
Ameripol 4751	.1400
Ameripol 4752	.1600
Ameripol 4753	.1480
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500	.2410
ASRC 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASRC 1712	.1885
ASRC 1713	.1750
TSRC 3105 and 3106	.2410
ASRC 3110	.2600
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1801	.1760
Baytown 1803	.1740
C-102 (Shell)	.2300
Carbomix 3750	.1820
Carbomix 3751	.1545
Carbomix 3752	.1845
Carbomix 3753	.1640
Carbomix 3756	.1569
Carbomix 3757	.1480
Carbomix 3758	.1545
Carbomix 3760	.1496
CB-102 (Shell)	.1850
Copo 1500	.2410
Copo 1502	.2410
Copo 1505-NS	.2610
Copo 1712	.1885
Copo 1773	.2060
Copo 1778	.1910
Copo 3700	.1725
Copo 3701	.1750
Copo 3900	.2310
FR-S 146	.2410
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 181	.2410
FR-S 182	.2410
FR-S 184	.1885
FR-S 1000	.2410
FR-S 1001	.1410
FR-S 1004	.2410
FR-S 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2410
FR-S 1014	.2810
FR-S 1500	.2410
FR-S 1502	.2410
FR-S 1703	.2060
FR-S 1710	.1885
FR-S 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1022	.2950
Naugapol 1023	.3150
Naugapol 1503	.2625
Naugapol 1504	.0330
Naugapol 6003	.2700
Naugapol 6100	.3100
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113C (Shell)	.1750
OB-114C (Shell)	.1420
Philprene 1000	.2410
Philprene 1001	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500	.2410
Philprene 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1960
Philprene 1605	.1900
Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1508	.2410
Plioflex 1510	.2410
Plioflex 1710C	.1885
Plioflex 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Krylene	.2410
Polysar Krylene NS	.2410
Polysar Krynol 651	.1885
Polysar Krynol 652	.1910
Polysar S	.2410
Polysar S-50	.2410
Polysar S-X 371	.2550
Polysar SS-250	.2875
S-1000	.2300
S-1002	.2325
S-1006	.2300
S-1009	.2400
S-1011	.2325
S-1013	.2300
S-1500	.2300
S-1502	.2300
S-1509	.2300
S-1600	.1825
S-1602	.1825
S-1605	.1800
S-1703	.1950
S-1707	.1800
S-1709	.1775
S-1710	.1775
S-1712	.1775
S-1803	.1650
S-1804	.1750
S-7701	.1850
SP-103 (Shell)	.2900
Synpol 1000	.2410
Synpol 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707	.1910
Synpol 1708	.1910
Synpol 1711	.1900
Synpol 1712	.1885
Synpol 8000	.2410
Synpol 8150	.1930
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8250	.1740
Synpol 8253	.1584
Synpol 8254	.1545
Synpol X-274	.2550

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215	.2300
Enjay Butyl 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Polysar Butyl 100	.2450
Polysar Butyl 101	.2775
Polysar Butyl 200 and 300	.2450
Polysar Butyl 301	.2550
Polysar Butyl 400	.2450

Chlorosulfonated Polyethylene

Hypalon 20	.4700
Hypalon 30	.6000
Hypalon 40	.5000

Fluoroelastomers

Kel-F Fluorel	$15.00
Kel-F 3700	$16.00
Kel-F 5500	$16.00
Viton A	$10.00
Viton A-HV	$10.00
Viton B	$13.00

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500
Neoprene Type AD	.5500
Neoprene Type FB	.6500
Neoprene Type GN	.4100
Neoprene Type GN-A	.4100
Neoprene Type GRT	.4200
Neoprene Type KNR	.7500
Neoprene Type S	.4200
Neoprene Type W	.3900
Neoprene Type WB	.4100
Neoprene Type WHV	.3900
Neoprene Type WRT	.4500
Neoprene Type WX	.4100

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.5000
Thiokol Type FA	.6900
Thiokol Type ST	1.2500

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50
GE Silicone Gum (not compounded)	4.00
Silastic (compounded)	2.50
Silastic (gums)	4.00
Union Carbide (gums)	4.00
Union Carbide (compounds)	2.50

SYNTHETIC RUBBER POLYMERS

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400 and N-401	.5400 [1]
Chemigum 200	.4800 [3]
Chemigum 235	.5300 [3]
Chemigum 236	.5300 [3]
Chemigum 245	.4500 [3]
Chemigum 246	.4500 [3]
Chemigum 247	.4500 [3]
Chemigum 248	.4500 [3]
Hycar 1512	.4500 [3]
Hycar 1551	.5300 [3]
Hycar 1552	.4500 [3]
Hycar 1561	.5300 [3]
Hycar 1562	.4500 [3]
Hycar 1571	.5300 [3]
Hycar 1572	.4500 [3]
Hycar 1577	.4500 [3]
Nitrex 2612	.4500 [1]
Nitrex 2616	.5300 [1]
Nitrex 2620	.4500 [1]
Nitrex 2625	.4500 [1]
Tylac 640	.4500 [1]
Tylac 740	.4900 [1]
Tylac 840	.5300 [1]
Tylac 1640	.5400 [1]
Tylac 2241	.5300 [1]
Tylac 2430	.5000 [1]
Tylac 2570	.5300 [1]
Tylac 2830	.4500 [1]

Butadiene-Styrene Types

CL-101 (Shell)	.2800 [3]
Copo 2000	.2775 [3]
Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3000 [3]
Copo 2109	.2775 [3]
Copo 2110	.3200 [3]
Copo 3852	.2900 [3]
FR-S 110	.3000 [3]
FR-S 150	.3000 [3]
FR-S 151	.2900 [3]
FR-S 174	.2950 [3]
FR-S 176	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000	.2775 [1]
Naugatex 2001	.2775 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105	.3200 [1]
Naugatex 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Naugatex 2113	.2900 [1]
Naugatex J-8174	.3200 [1]
Naugatex J-8535	.3000 [1]
Pliolite 2000	.2775 [3]
Pliolite 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite 2107	.3200 [3]
Pliolite 2108	.3000 [3]
S-2000 and S-2006	.2600 [3]
S-2101	.2600 [3]
S-2105	.2800 [3]
S-2108	.2900 [3]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [3]
Neoprene Latex 842-A	.3700 [3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [3]
Thiokol Type WD-2	1.2500 [3]
Thiokol Type WD-6	.8000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

Suppliers

To add your synthetic rubbers to this section write the editor giving pertinent information.

DCI MAGNESIA PRODUCTS

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ANALYSIS OF DCI MAGNESIAS

	DCI Magnesium Oxide Light TECHNICAL	DCI Magnesium Oxide Medium TECHNICAL E-3	DCI Magnesium Oxide Heavy TECHNICAL	DCI Magnesium Oxide Heavy TECHNICAL	DCI Magnesium Carbonate TECHNICAL	DCI Magnesium Hydroxide N. F. & TECHNICAL
Product No.	1001	7001	4001-4002	8001	2001	3001
Bulk Density	Granular 5 lbs.	20 lbs	20-26 lbs	40 lbs	9 lbs	13 lbs
weight per cu. ft.	Powder 9 lbs					
Ignition loss	5.0 %	6.0 %	4.0 %	4.0 %	57.16 %	
ANALYSIS: IGNITED BASIS						
SiO_2	0.04 %	0.4 %	0.7 %	2.4 %	0.11 %	0.03 %
Fe_2O_3	0.03 %	0.2 %	0.4 %	0.07 %	0.02 %	0.02 %
AL_2O_3	0.11 %	0.1 %	0.1 %	0.04 %	0.03 %	0.06 %
CaO	1.36 %	1.3 %	1.4 %	0.49 %	0.30 %	0.94 %
SCREEN TEST						
thru 200 mesh	100 %	100 %	93 % or		100 %	100 %
thru 325 mesh	99.5 %	99.5 %	99.5 %	99 %	99.9 %	99.9 %

For free technical assistance and price information regarding D C I Magnesia Compounds, be sure to get in touch with . . . . . .

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Represented by: Summit Chemical Co., Akron, Ohio
Tumoor Chemical Co., Chicago, Ill.
The B. E. Dougherty Co., Los Angeles & San Francisco

MARKETS

(continued)

Reclaimed Rubber

Disappointing first quarter automobile sales may set the tone for the reclaimed rubber industry in the first few months of 1960. In general, however, the reclaimed rubber industry is not too badly off and most estimates place 1960 consumption at or near the 300,000 ton level.

While automobile sales in the United States may be somewhat lower than anticipated, it is generally believed that export sales of reclaimed rubber during 1960 will be on the increase. Continuing high prices for natural rubber also create a beneficial atmosphere for reclaim.

The mood at the moment seems to be one of watchful waiting. General industrial activity in the spring may hold the key to what the year is likely to bring.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

The trade reports that fairly good activity characterized the scrap rubber market during the past few weeks. Scrap was moving regularly to consumers with most of the buying interest centered on tubes. Mixed automobile tires showed some strength.

The scrap rubber market, of course, followed the general pattern set by reclaimers and the rubber industry as a whole. In light of this historical situation it may also be expected that first quarter sales of scrap rubber may be somewhat below that expected a few months ago.

In balance, however, there is nothing evident now which would contradict earlier consumption estimates for the entire year. Scrap consumption in 1960 should still run to some 300,000 long tons.

(Prices Delivered Akron)

Mixed tires	ton	15.00
Light colored carcass	lb.	.05¼
No. 1 peelings	ton	40.00
No. 2 peelings	ton	28.00
No. 3 peelings	ton	23.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	22.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07¼
Natural Rubber Black Tubes	lb.	.06½
Butyl Rubber Tubes	lb.	.07½

Tire Fabrics

Competition for the tire cord market is increasing with the expansion of facilities to produce industrial nylon yarns. Dow Chemical Co. has moved into the field, recently announcing plans to build a 12-million-pound-a-year plant at Williamsburg, Va., for the production of nylon-6. The plant is due on stream late next year.

Indications are that a nylon-6 capacity race is well under way. Late last year, Firestone announced plans to build a 12-million-pound-per-year plant at Hopewell, Va., and only last month, Allied Chemical Co. disclosed plans to triple its nylon-6 capacity at Hopewell. Allied Chemical's capacity is expected to be up to about 75 million pounds by mid-1961.

On the other hand, Chemstrand Corp. plans to increase, by more than 50 per cent, its capacity to produce nylon-66. According to Edward A. O'Neal, Jr., president of the firm, "The current multi-million-dollar expansion, coupled with plans for expansion in the near future by the industry, will assure tire manufacturers of a supply of nylon tire yarn adequate to meet the total demand of the tire industry." The expansion should be completed by 1961.

Price War Continues

This latest move promises to sharpen the three-cornered battle between the two types of nylon and high strength rayon. A bitter price war is being waged between makers of nylon and rayon in an attempt to capture the $300,000,000-a-year tire yarn market.

A further development is that new materials are also being considered. Firestone has indicated an interest in Dacron as a potential tire yarn and might start manufacturing the fiber. Some speculate that the nylon-6 facility now under construction might later be converted to Dacron production. Air Reduction Co. is considering a synthetic fiber called Vinal as a possible tire cord.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.62½
1650	lb.	.62
2200	lb.	.62½

Nylon Tire Cord

210	lb.	1.75
840	lb.	1.47

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.72
11.65 oz. (per square yard)	lb.	.66
14.4 oz. (per square yard)	lb.	.75

Liquid Latex

Natural: Natural rubber latex is now selling in the 47-48c range in car load lots in East Coast ports thus continuing the relatively high price levels which have been in evidence for some time. During most of 1959 high natural latex prices were balanced by the high level of demand, and so the general market tone was not disturbed to any great degree.

Now, however, some general slackening seems to be afflicting all industry and under these conditions it is likely that natural latex, because of its price structure, will feel the pinch more keenly than most.

Short term disturbances have a way of setting patterns for consumers. A given consumer turned to another material because of prices of a competitive material, soon gets into the "habit" of using only the competitive product. The short term disturbance thus becomes a long term problem.

The general atmosphere which natural latex generates during 1960 may do much to set the pattern for the years that lie ahead.

Synthetic: The synthetic latex market, on the face of it, would seem likely to suffer less than other market segments during lackadaisical market periods. A major factor in favor of synthetic latex is its relatively stable price structure. Thus, while some dislocations of a short nature may be in the offing, the long term prospects for this segment of the market are happy indeed. There is still reason to believe that synthetic latex consumption in 1960 will be on the happy side.

Cotton

The price of middling uplands on the New York Cotton Exchange moved in the extremely narrow range of ten points since our last report (February 1), high for the period being 33.25c reached on nine days during the month, and low being 33.15c, also reached on nine days during the month. The average price of spot cotton for the month of February was 33.20c based on 20 trading days. This compares with an average of 33.09c in the previous month.

The world cotton situation this season appears to be more favorable than it has been for some time according to the International Cotton Advisory Committee. Production and consumption are both at record levels and there is every indication that there will be a further reduction in the carryover on July 31.

A marked increase in cotton exports from the United States is anticipated and consumption prospects are such that exports of cotton from other nations in the Free World will not be affected.

World production this season is estimated at 31,600,000 bales compared with last season's 29,000,000 bales and the previous high of 31,000,000 bales in the 1955-56 season. The United States crop is expected to be up by more than 3,000,000 bales.

290,000,000 passengers in one year

make little impression on seat fabric

Public Service Coordinated Transport, owner and operator of 2511 buses in New Jersey, with established routes into the cities of New York, Philadelphia and Wilmington, carried 290,000,000 passengers over 90,000,000 miles in 1958 alone. Impressive as these statistics sound, they made little or no impression on the heavy duty coated fabric upholstery used by the company. So sturdy is this material that much of Public Service's original purchase, made in 1947, is still standing up under everyday use.

In making Koroseal, the supported vinyl upholstery material producing these amazing wear results, B. F. Goodrich looks to Wellington Sears for the strong fabric backing it requires . . . one of the many Wellington Sears fabrics engineered for specific jobs of all kinds.

For cotton or synthetic industrial textiles, more and more companies are turning to Wellington Sears – and taking advantage of our more than a century of experience in providing fabrics to industry. For help in your own fabric applications, write for technical assistance and a free illustrated booklet, "Fabrics Plus," Dept. G-3.

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STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,143	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10.856	422.714
1943	55,329	317,634	20,815	139.594
1944	107,834	144,113	9,665	93.650
1945	135,672	105.429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89.215
1951	733,048	454,015	2,603	76.569
1952	805,997	453,846	3.024	95.260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1955	635,174	634,800	10,611	110,105
1956	580,510	563,095	11,300	115,949
1957	499,121	539,761	10,146	100,901
1958	474,409	484,492	20,085	76,491
1959:				
Jan.	54,950	49,913	1,438	82,487
Feb.	48,917	47,345	1,561	79,657
Mar.	48,584	51,991	2,131	78,871
Apr.	34,828	40,850	1,700	78,900
May	45,451	38,777	1,967	82,983
June	45,111	48,570	2,350	85,010
July	47,527	47,545	1,323	80,059
Aug.	46,453	46,914	1,650	80,106
Sept.	41,420	49,582	1,480	76,935
Oct.	48,378	49,049	1,202	74,172
Nov.	48,844	42,039	1,155	80,547
Dec.	42,293	43,160	1,130	79,475

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1936	467,064	152,072,496	19,852	6,659,899	486,916
1937	574,600	237,307,041	23,185	10,213,670	597.785
1938	397,640	125,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1955	542,507	360,435,303	92,825	80,163,114	635,332
1956	499,479	334,990,045	71,709	61,795,844	564,321
1957	475,958	291,337,628	78,567	58,249,788	554,174
1958	406,059	153,127,066	67,593	45,047,040	473,652
1959:					
May	37,444	23,371,117	6,006	4,990,906	45,450
June	43,067	23,474,991	7,445	5,635,689	50,512
July	42,058	27,606,695	5,469	4,524,071	47,527
Aug.	38,228	26,533,930	7,131	5,487,070	45,359
Sept.	40,696	29,259,772	6,947	5,698,625	47,643
Oct.	41,631	31,108,534	6,747	5,612,350	48,378
Nov.	43,789	33,218,969	5,055	3,986,638	48,844

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America*	Rest of World*	Total*
1947	646,362	277,951	89,000	38,128	34,928	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318	225,659	1,490,000
1950	694,090	696,472	113,500	48,482	26,902	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000	344,584	1,897,500
1956	568,550	686,667	95,389	89,072	22,457	336,015	1,857,000
1957	638,706	684,515	98,164	58,440	28,351	381,824	1,890,000
1958	663,644	614,561	100,196	103,613	26,268	446,718	1,955,000
1959:							
May	55,893	67,362	6,477	8,334	2,826	31,608	172,500
June	58,206	68,457	4,972	8,711	1,373	23,281	165,000
July	62,544	54,291	7,175	10,300	2,552	43,138	180,000
Aug.	61,426	61,402	8,926	9,736	1,607	34,403	177,500
Sept.	61,809	55,840	8,197	9,590	1,241	33,323	170,000
Oct.	61,455	71,004	9,630	10,919	600	38,892	192,500
Nov.	59,732	62,548	9,893	4,285	600	42,942	180,000

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	630,000	464,250	2,980,000
1956	1,436,482	232,345	91,458	775,500	489,215	3,025,000
1957	1,464,640	239,021	88,379	777,250	565,710	3,135,000
1958	1,364,404	238,439	83,904	905,000	638,353	3,230,000
1959:						
May	113,392	19,851	8,518	86,500	51,739	280,000
June	139,481	26,394	9,752	90,000	59,373	325,000
July	141,279	18,393	7,990	76,750	55,588	300,000
Aug.	137,951	15,372	6,387	59,000	51,290	270,000
Sept.	146,111	26,426	9,227	86,250	66,968	335,000
Oct.	147,643	22,117	8,686	84,000	65,054	327,500

Source: International Rubber Study Group. * Estimated.

Rim Production

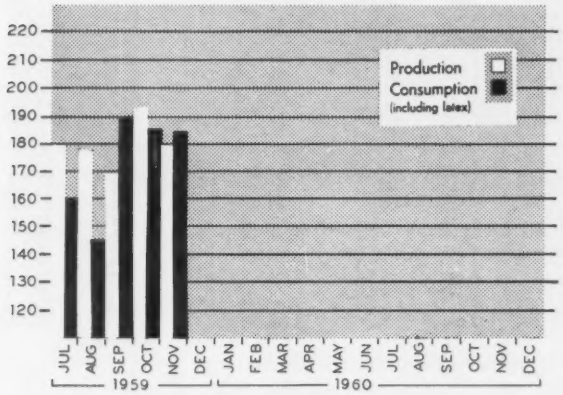
	1955	1956	1957	1958	1959
Passenger Car	38,092,080	27,109,610	27,301,567	20,665,688	25,412,177
Truck & Bus	6,642,329	6,315,428	5,468,223	3,887,910	5,019,261
Agricultural	1,931,768	1,416,938	1,368,127	1,218,240	1,386,866
Earth Mover	38,849	88,812	67,289	61,883	111,077
Total	46,705,036	34,930,788	34,205,206	25,833,721	31,929,381

	1959: July	Aug.	Sept.	Oct.	Nov.	Dec.
Passenger Car	1,816,678	1,413,466	1,760,810	1,872,647	1,117,817	2,205,434
Truck and Bus	449,744	356,554	328,918	225,625	183,752	421,976
Agricultural	74,252	106,041	98,625	74,174	79,419	77,892
Earth Mover	6,419	14,686	3,186	11,648	1,350	8,967
Total	2,347,093	1,890,747	2,191,539	2,184,094	1,382,338	2,714,269

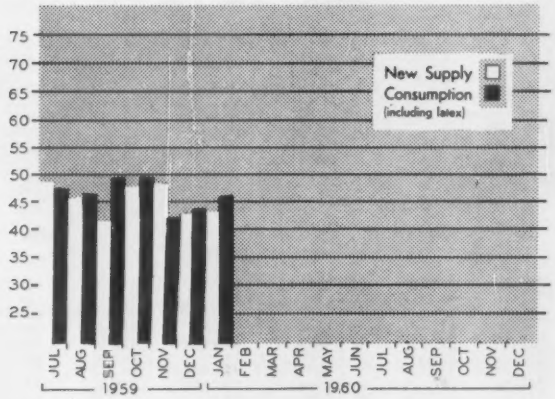
Source: The Tire & Rim Association, Inc.

STATISTICS at a glance

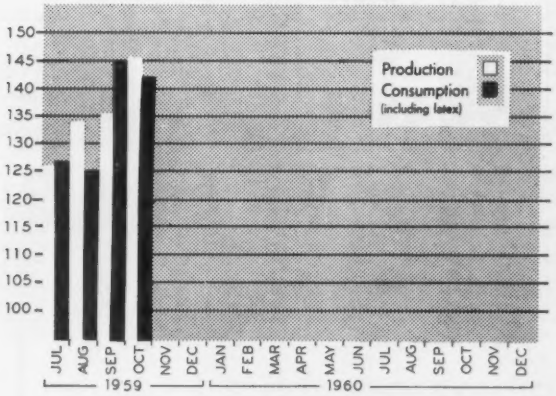
NATURAL RUBBER—WORLD
(thousands of long tons)



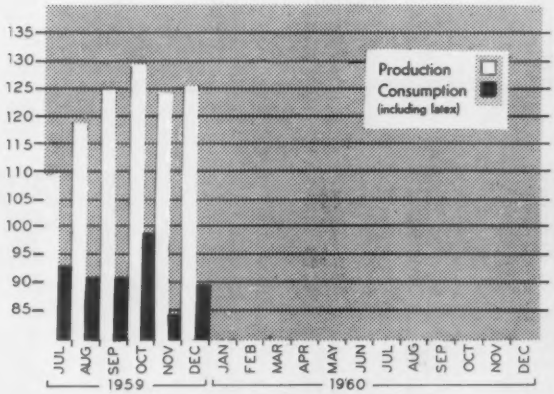
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



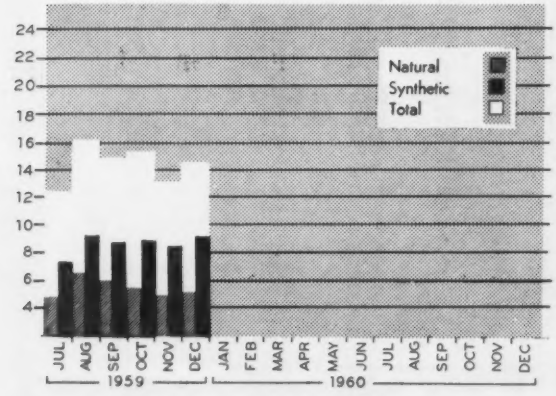
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



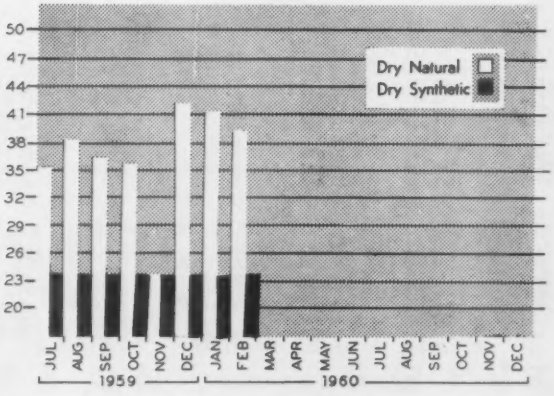
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1949	310,539	35,215	54,046	11,072	410,932
1950	378,887	50,067	60,915	12,037	501,906
1951	704,529	58,907	76,475	15,333	855,244
1952	654,854	65,745	81,630	16,228	818,447
1953	680,728	80,495	79,801	20,198	861,222
1954	490,405	69,150	58,802	21,396	639,753
1955	801,145	91,357	56,179	32,623	982,304
1956	876,982	99,412	75,873	34,547	1,086,814
1957	913,321	110,721	67,418	33,618	1,125,078
1958	872,565	97,806	54,113	32,431	1,056,915
1959:					
Jan.	90,622	9,991	5,305	3,304	109,222
Feb.	83,662	10,256	5,898	3,407	103,223
Mar.	92,315	9,690	6,226	3,818	112,049
Apr.	88,509	10,455	6,301	3,324	108,589
May	89,625	10,249	6,470	3,617	109,961
June	87,226	10,216	5,590	3,707	106,739
July	95,207	9,365	6,420	3,843	114,835
Aug.	97,494	10,471	8,179	3,451	119,545
Sept.	98,117	10,888	7,717	3,940	120,662
Oct.	107,120	10,099	8,223	3,864	129,306
Nov.	101,856	11,660	7,523	3,786	124,825

Consumption

1950	416,230	43,781	66,348	11,930	538,289
1951	626,444	48,887	70,500	13,066	758,897
1952	666,420	55,522	71,229	13,866	807,037
1953	624,181	65,900	77,826	16,929	784,836
1954	500,345	57,203	61,464	17,715	636,727
1955	741,997	72,876	53,991	26,035	894,899
1956	727,789	74,887	49,615	24,976	877,267
1957	767,218	75,461	55,413	25,187	923,279
1958:	730,196	69,694	53,432	26,590	880,912
1959.					
Jan.	74,222	7,198	5,359	2,857	89,636
Feb.	72,558	6,885	5,256	2,694	87,393
Mar.	78,792	7,444	5,687	3,166	95,089
Apr.	64,547	7,493	4,758	2,941	79,739
May	60,870	6,914	3,978	2,853	74,615
June	76,065	7,083	5,484	3,063	91,695
July	78,995	6,277	6,043	2,419	93,734
Aug.	75,340	7,117	5,533	3,047	91,037
Sept.	79,835	7,326	6,579	3,119	90,859
Oct.	81,963	7,538	5,965	3,128	98,594
Nov.	69,217	6,684	5,327	2,655	83,883

Exports

1950	900	4,826	31	1,895	7,652
1951	483	6,825	216	1,725	9,249
1952	9,467	9,813	126	2,695	22,101
1953	7,692	11,494	237	3,245	22,668
1954	11,069	12,062	2,831	4,155	30,117
1955	60,704	18,098	9,895	4,593	93,290
1956	112,366	21,909	8,699	6,194	149,168
1957	157,977	30,242	8,748	6,377	203,344
1958	142,069	31,337	13,793	6,718	193,917
1959:					
Jan.	11,962	3,430	1,579	520	17,491
Feb.	11,615	2,404	1,169	648	15,836
Mar.	16,295	2,712	2,238	467	21,712
Apr.	19,154	3,741	2,135	527	25,557
May	12,281	2,942	2,587	642	18,452
June	21,871	2,522	2,386	937	27,716
July	19,814	4,105	1,580	440	25,939
Aug.	18,054	2,557	1,896	1,025	23,532
Sept.	22,506	4,864	2,240	692	30,302
Oct.	13,476	2,250	1,383	679	17,788

Stocks

1949	77,731	4,654	12,224	3,433	98,042
1950	36,942	5,733	7,243	2,840	52,758
1951	105,271	8,379	12,481	3,821	129,912
1952	83,861	8,535	22,716	3,875	118,987
1953	135,153	11,480	24,866	4,346	175,845
1954	113,499	11,349	19,267	4,280	150,395
1955	108,989	12,220	10,500	6,030	137,739
1956	151,763	14,077	28,744	7,934	202,518
1957	140,199	18,843	31,489	7,454	197,985
1958	143,533	15,688	18,770	7,292	185,283
1959:					
Mar.	146,971	14,701	14,441	7,753	183,866
Apr.	147,867	14,848	12,496	7,728	182,939
May	156,209	15,024	12,710	7,820	191,763
June	145,486	14,986	11,128	7,969	179,569
July	142,606	15,187	9,899	8,912	176,604
Aug.	148,795	15,745	10,558	8,418	183,516
Sept.	147,400	12,845	9,535	8,526	178,306
Oct.	157,768	13,385	10,805	8,649	190,607
Nov.	168,490	13,043	11,447	9,077	202,057

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955	92,754	69,364	10,432	10,798	90,594	183,348
1956	72,013	69,720	10,642	10,650	91,012	163,025
1957	72,252	74,535	10,403	11,420	96,358	168,610
1958	67,591	65,669	10,679	11,560	87,908	155,499
1959:						
Jan.	8,574	7,801	1,049	1,104	9,954	18,528
Feb.	5,746	7,578	998	1,161	9,737	15,483
Mar.	7,039	8,587	1,013	1,269	10,869	17,908
Apr.	6,342	6,730	1,301	911	8,942	15,284
May	6,007	6,583	1,146	1,156	8,885	14,892
June	7,445	6,730	1,223	1,196	9,149	16,594
July	5,469	6,871	956	1,279	9,106	14,575
Aug.	7,131	8,225	1,242	1,258	10,725	17,856
Sept.	6,947	8,201	956	1,364	10,521	17,468
Oct.	6,747	9,424	1,020	1,187	11,631	18,378
Nov.	5,055	8,144	1,206	1,104	10,454	15,509

Consumption[1]

1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29 000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,274	2,628	39,938	86,688
1952	53,567	40,562	7,363	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1955	86,478	63,982	8,736	8,495	81,213	167,691
1956	74,082	62,762	8,708	8,021	79,491	153,573
1957	75,009	68,305	9,039	8,630	85,974	160,983
1958	70,183	60,283	9,555	10,549	80,387	150,570
1959:						
Jan.	7,184	6,886	925	1,244	9,055	16,239
Feb.	6,489	7,083	859	1,009	8,951	15,440
Mar.	7,052	7,275	1,054	1,208	9,537	16,589
Apr.	5,793	5,629	1,104	1,169	7,902	13,695
May	5,429	5,962	995	1,112	8,069	13,498
June	5,622	6,497	910	1,150	8,557	14,179
July	5,004	5,804	919	940	7,663	12,667
Aug.	6,613	7,348	961	1,116	9,425	16,038
Sept.	6,342	6,919	910	1,178	9,007	15,349
Oct.	6,153	7,388	969	1,158	9,515	15,668
Nov.	4,858	6,427	893	981	8,301	13,159

Stocks at End of Period

1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5.504	10.256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1955	13,203	6,980	1,236	1,807	10,203	23,406
1956	12.064	7,451	1,384	1,558	10,393	22,457
1957	14,454	8,347	1,267	1,974	11,588	26,042
1958	8,900	7,672	1,663	2,519	11,854	20,754
1959:						
Jan.	10,025	7,822	1,551	2,418	11,791	21,816
Feb.	10,482	7,753	1,488	2,535	11,776	22,258
Mar.	9,375	8,209	1,441	2,670	12,320	21,695
Apr.	8,599	7,859	1,458	2,379	11,696	20,295
May	9,718	7,917	1,417	2,398	11,732	21,450
June	11,063	7,314	1,601	2,432	11,347	22,410
July	10,752	6,983	1,528	2,761	11,272	22,024
Aug.	11,472	6,775	1,576	2,779	11,130	22,602
Sept.	11,742	7,196	1,498	2,810	11,504	23,246
Oct.	12,220	7,570	1,464	2,888	11,922	24,142
Nov.	11,707	8,279	1,451	2,975	12,705	24,412

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

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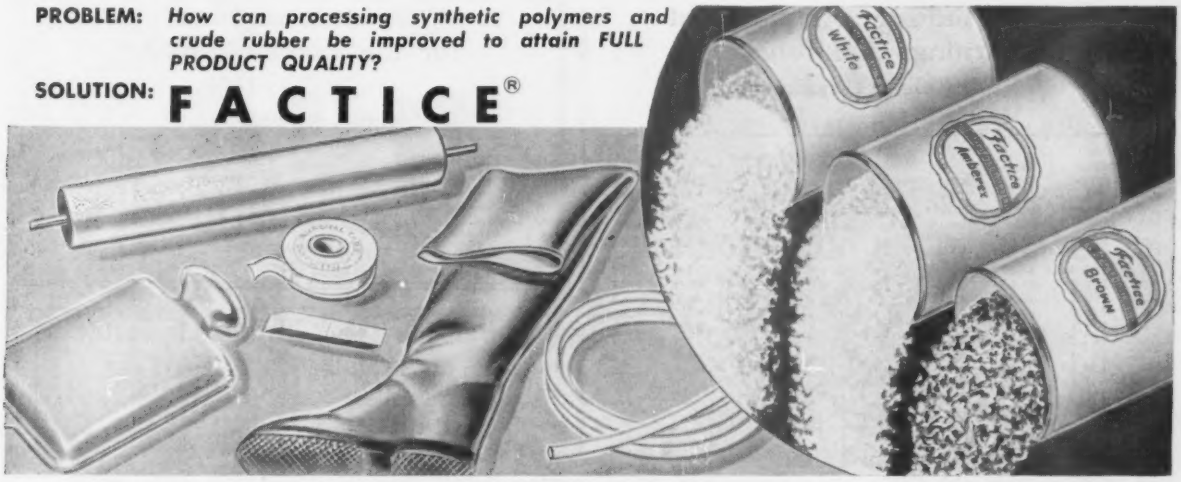

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Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1958 Production Workers (thousands)	1958 Average Weekly Earnings	1958 Average Weekly Hours	1958 Average Hourly Earnings	1959 Production Workers (thousands)	1959 Average Weekly Earnings	1959 Average Weekly Hours	1959 Average Hourly Earnings
Jan.	200.9	$87.48	38.2	$2.29	199.1	$100.28	41.1	$2.45
Feb.	191.3	85.04	37.3	2.28	198.8	101.09	41.6	2.44
Mar.	184.0	87.02	38.0	2.29	201.5	103.74	42.0	2.43
Apr.	176.0	85.88	37.5	2.29	176.0	101.57	41.8	2.47
May	172.3	87.86	38.2	2.30	171.8	101.46	42.1	2.43
June	175.8	91.10	39.1	2.33	196.1	98.74	40.3	2.45
July	175.1	91.89	39.1	2.35	203.4	107.10	42.5	2.52
Aug.	181.2	96.80	40.5	2.39	203.8	105.53	42.3	2.49
Sept.	187.5	97.51	40.8	2.39	212.4	102.01	41.3	2.47
Oct.	194.5	97.27	40.7	2.39	212.1	101.18	40.8	2.48
Nov.	195.3	98.09	40.7	2.41	209.7	.....	...	...
Dec.	198.2	102.66	41.9	2.45	....	.....	...	...

Tires and Tubes

Jan.	81.6	98.52	36.9	2.67	76.9	117.55	41.1	2.87
Feb.	78.5	93.02	36.1	2.65	76.2	118.98	41.6	2.86
Mar.	76.0	98.05	37.0	2.65	77.9	122.96	42.4	2.86
Apr.	72.1	95.67	36.1	2.65	66.0	123.98	42.9	2.90
May	70.4	99.48	37.4	2.66	52.2	126.13	42.9	2.89
June	71.2	103.63	38.1	2.72	70.7	108.93	36.8	2.96
July	71.0	106.59	38.9	2.74	79.7	128.74	43.2	2.98
Aug.	72.5	113.96	40.7	2.80	78.4	127.74	43.3	2.95
Sept.	74.1	113.40	40.5	2.80	80.5	117.56	40.4	2.91
Oct.	75.3	113.24	40.3	2.81	79.8	118.59	40.2	2.95
Nov.	76.2	115.75	40.9	2.83	....	.....	...	...
Dec.	77.1	121.40	42.2	2.87	....	.....	...	...

Rubber Footwear

Jan.	17.5	74.87	39.2	1.91	17.1	78.20	39.9	1.96
Feb.	17.0	74.68	39.1	1.91	17.1	80.59	40.7	1.96
Mar.	16.7	76.61	39.9	1.92	17.4	79.79	40.3	1.98
Apr.	16.5	75.46	39.3	1.92	12.9	73.05	39.7	1.98
May	16.3	75.85	39.3	1.93	17.7	79.58	40.6	1.84
June	16.3	11.20	40.0	1.93	18.2	81.58	41.2	1.98
July	15.9	75.25	39.4	1.91	18.3	78.60	40.1	1.96
Aug.	16.4	77.18	40.2	1.92	18.4	79.17	40.6	1.95
Sept.	16.8	76.62	39.7	1.93	19.0	79.18	40.4	1.96
Oct.	17.1	77.01	39.9	1.93	19.0	79.20	39.8	1.99
Nov.	17.2	77.22	39.6	1.95	....	.....	...	...
Dec.	17.1	78.01	39.8	1.96	....	.....	...	...

All Other Rubber Products

Jan.	101.8	80.94	39.1	2.07	105.1	91.27	41.3	2.21
Feb.	95.8	80.32	38.8	2.07	105.5	91.96	41.8	2.21
Mar.	91.3	79.87	38.4	2.08	106.2	93.02	41.9	2.20
Apr.	87.4	79.87	38.4	2.08	97.1	90.03	41.3	2.22
May	85.6	80.29	38.6	2.08	101.9	92.18	41.9	2.18
June	88.3	83.77	39.7	2.11	107.2	94.98	42.4	2.24
July	88.2	82.92	39.3	2.11	105.4	95.40	42.4	2.25
Aug.	92.3	86.24	40.3	2.14	107.0	93.21	41.8	2.23
Sept.	96.6	89.21	41.3	2.16	112.9	94.73	42.1	2.25
Oct.	102.1	88.78	41.1	2.16	113.3	92.74	41.4	2.24
Nov.	101.9	88.54	40.8	2.17	....	.....	...	...
Dec.	104.0	92.60	41.9	2.21	....	.....	...	...

Source: U. S. Department of Labor.
Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1953	1954	1955	1956	1957	1958	1959	1960
Jan.	33.24	34.16	35.07	35.24	34.82	36.31	35.67	33.09
Feb.	33.76	35.00	35.04	36.26	34.82	35.83	35.69	33.20
Mar.	34.10	35.23	34.33	36.70	35.35	36.05	35.71	....
Apr.	33.85	35.22	34.23	36.43	35.43	36.00	36.05	....
May	34.30	35.34	34.80	36.65	35.40	36.27	36.24	....
June	34.11	35.17	34.83	36.67	35.45	36.33	36.05	....
July	34.20	35.37	34.61	35.43	35.49	36.51	34.67	....
Aug.	33.82	35.19	34.53	34.31	35.15	36.36	33.17	....
Sept.	33.69	35.46	33.85	34.35	34.74	36.00	32.99	....
Oct.	33.53	35.24	33.93	34.45	35.09	36.23	32.77	....
Nov.	33.60	34.80	34.87	34.56	36.06	36.24	32.79	....
Dec.	33.52	35.03	34.95	34.56	36.50	35.75	33.02	....
Average for Year	33.81	35.10	34.59	35.50	35.36	36.16	34.57	....

Note: The Government established a ceiling of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1957 = 100)

(Based on man-hours)

	1957	1958	1959		1957	1958	1959
Jan.	145	116	108	July	136	125	128
Feb.	141	114	113	Aug.	141	131	120
Mar.	145	116	112	Sept.	138	136	120
Apr.	132	112	104	Oct.	136	133	115
May	134	113	105	Nov.	131	141	113
June	135	125	117	Dec.	117	140	116

Sales by the Rubber Industry

(in Millions of Dollars*)

	1957	1958	1959		1957	1958	1959
Jan.	496	448	508	July	514	478	519
Feb.	495	413	490	Aug.	514	438	492
Mar.	476	396	506	Sept.	481	464	544
Apr.	490	429	543	Oct.	490	493	555
May	481	428	524	Nov.	431	472	482
June	458	445	520	Dec.	427	518	508

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1957	1958	1959		1957	1958	1959
Jan.	1,047	1,100	998	July	1,045	980	1,075
Feb.	1,036	1,087	1,022	Aug.	1,074	1,024	1,113
Mar.	1,030	1,069	1,030	Sept.	1,074	1,024	1,114
Apr.	1,031	1,047	1,015	Oct.	1,097	1,022	1,115
May	1,024	1,020	995	Nov.	1,101	1,018	1,120
June	1,027	986	1,013	Dec.	1,092	994	1,124

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1918	70	40	60.15	1939	24	14⅛	17.57
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	22.40
1921	21¼	11½	16.36	1942	22½	22½	22.50
1922	28⅛	13⅜	17.50	1943	22½	22½	22.50
1923	37⅛	24¾	29.45	1944	22½	22½	22.50
1924	40⅛	17⅜	26.20	1945	22½	22½	22.50
1925	121	34⅜	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¼	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅝	4¼	6.17	1952*	33	26½	29.15
1932	4¾	2½	3.49	1953	31⅞	19⅞	24.21
1933	9⅞	2⅜	5.96	1954	34½	19½	23.61
1934	15⅞	8¾	12.92	1955	52	29⅜	39.16
1935	13¾	10½	12.37	1956	45	26½	34.24
1936	23	13½	16.41	1957	37⅜	26⅜	31.13
1937	26⅞	14	19.39	1958	32⅝	24⅝	28.13
1938	17 1/16	10¼	14.64	1959	49	29¾	36.56

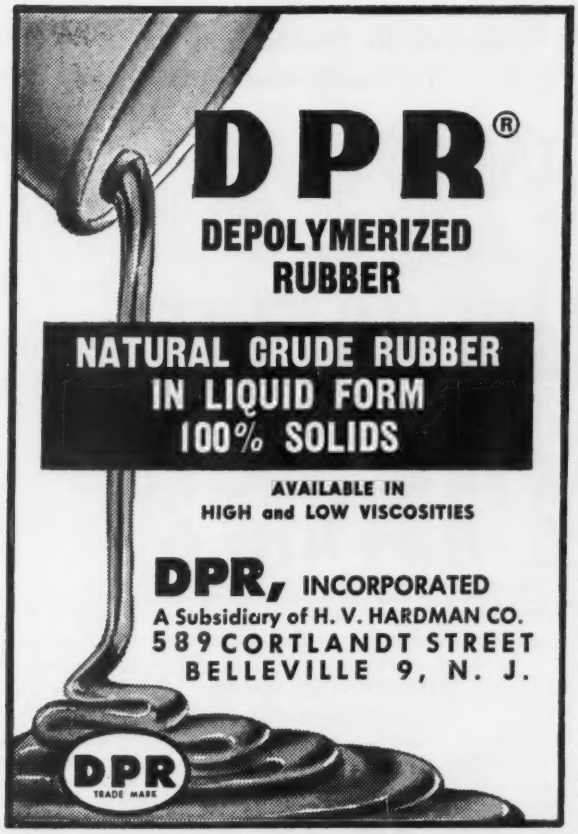
Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1953	1954	1955	1956	1957	1958	1959	1960
Jan.	29.40	20.22	33.92	41.70	33.32	27.15	30.34	41.18
Feb.	27.57	19.98	34.90	33.68	30.43	26.32	30.26	39.33
Mar.	26.59	20.16	31.08	33.68	31.76	26.65	31.62	....
Apr.	24.66	22.06	31.75	31.75	32.23	26.44	33.72	....
May	25.52	21.96	31.35	29.61	32.12	25.51	36.48	....
June	24.42	23.01	34.74	30.54	32.80	26.20	34.31	....
July	23.64	24.12	40.84	33.91	32.88	27.70	35.19	....
Aug.	23.06	23.00	48.85	35.69	32.13	28.72	38.43	....
Sept.	23.06	23.00	48.27	32.64	29.94	29.49	40.22	....
Oct.	20.82	26.57	43.81	32.68	29.24	31.06	41.50	....
Nov.	20.58	28.07	44.95	35.18	27.47	32.10	45.16	....
Dec.	20.92	29.88	48.40	37.01	29.25	30.28	41.46	....
Average for Year	24.21	23.61	39.16	34.24	31.13	28.13	36.56	....

Note: (*) Free trading suspended March 31, 1951, and resumed on July 1, 1952.



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	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1951 (total)	32,153	44,612	1,677	78,442	83,405	8,765
Passenger Car.	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total)	29,484	54,342	1,520	85,346	90,411	14,110
Passenger Car.	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	37,949	55,124	1,543	94,617	96,150	15,720
Passenger Car.	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1954 (total)	33,333	55,155	1,753	90,241	89,141	14,762
Passenger Car.	29,741	47,044	928	77,713	76,794	12,217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1955 (total)	47,374	59,246	1,879	108,499	112,178	18,778
Passenger Car.	42,574	50,189	966	93,730	97,223	15,963
Truck and Bus	4,800	9,057	912	14,769	14,955	2,815
1956 (total)	35,422	62,146	1,757	99,325	100,406	79,872
Passenger Car.	30,873	53,252	875	85,000	85,546	16,494
Truck and Bus	4,548	8,894	883	14,325	14,859	3,378
1957 (total) ...	36,765	65,150	1,733	103,649	106,940	250,536
Passenger Car.	32,725	56,603	889	90,217	93,542	210,146
Truck and Bus	4,053	8,546	846	13,432	13,398	40,384
1958 (total)	26,783	70,797	1,348	98,928	96,563	20,939
Passenger Car.	23,408	61,570	717	85,696	83,636	17,778
Truck and Bus	3,375	9,226	631	13,232	12,927	3,161
1959 (total)	34,163	76,812	1,430	112,405	117,875	26,933
Passenger Car..	29,746	66,797	786	97,329	102,637	23,578
Truck and Bus	4,417	10,015	644	15,076	15,238	3,355
1959:						
Feb. (total)	2,805	5,611	135	8,551	10,270	23,019
Passenger Car.	2,442	4,932	60	7,434	8,962	19,435
Truck and Bus	364	679	74	1,117	1,308	3,584
Mar. (total)	3,336	7,103	117	10,557	11,350	23,862
Passenger Car.	2,930	6,261	62	9,253	9,959	20,181
Truck and Bus	406	842	56	1,304	1,391	3,680
Apr. (total)	3,594	7,297	109	10,999	8,025	20,872
Passenger Car.	3,115	6,390	65	9,569	6,986	17,597
Truck and Bus	479	907	44	1,430	1,039	3,276
May (total)	3,291	6,356	79	9,726	7,796	18,727
Passenger Car.	2,848	5,617	38	8,504	6,853	15,721
Truck and Bus	442	738	41	1,222	843	3,006
June (total)	3,392	6,756	90	10,237	10,294	19,088
Passenger Car.	2,903	5,936	46	8,886	9,022	16,134
Truck and Bus	488	820	44	1,352	1,272	2,954
July (total)	3,588	6,832	112	10,532	11,223	19,877
Passenger Car.	3,188	5,988	65	9,242	9,857	16,853
Truck and Bus	340	844	47	1,290	1,366	3,023
Aug. (total)	1,249	6,595	114	7,957	9,683	21,730
Passenger Car.	973	5,721	67	6,761	8,458	18,677
Truck and Bus	276	874	46	1,196	1,225	3,054
Sept. (total)	2,345	6,819	135	9,298	10,103	22,542
Passenger Car.	1,923	5,850	77	7,850	8,804	19,636
Truck and Bus	422	969	58	1,448	1,299	2,906
Oct. (total)	2,966	7,166	136	10,269	10,884	23,151
Passenger Car.	2,628	6,015	79	8,722	9,374	20,287
Truck and Bus	338	1,151	57	1,547	1,510	2,864
Nov. (total)	1,440	4,898	120	6,458	8,347	25,133
Passenger Car..	1,252	4,161	64	5,476	7,088	21,996
Truck and Bus	189	737	56	982	1,259	3,137
Dec. (total)	3,197	4,565	180	7,942	9,645	26,933
Passenger Car..	2,912	3,826	105	6,844	8,344	23,578
Truck and Bus	285	739	75	1,099	1,301	3,355

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1946	2,148,699	930,760	3,079,429	1956	5,816,109	1,100,417	6,916,526
1947	3,558,178	1,220,634	4,778,812	1957	6,113,344	1,097,006	7,210,350
1948	3,909,270	1,363,856	5,132,090	1958	4,257,812	874,278	5,132,090
1949	5,108,841	1,123,736	6,232,577	1959	5,591,243	1,134,858	6,726,101
1958:							
Jan.	478,416	79,790	558,206	July	316,408	65,047	381,455
Feb.	396,221	71,024	467,245	Aug.	194,974	55,221	250,195
Mar.	359,464	73,658	433,122	Sept.	102,687	46,353	149,040
Apr.	322,482	73,886	396,368	Oct.	272,241	69,934	342,175
May	352,076	75,291	427,367	Nov.	511,885	93,282	605,167
June	342,228	70,652	412,880	Dec.	608,730	100,140	708,870
1959:							
Jan.	539,451	96,044	635,495	July	548,524	114,687	663,211
Feb.	476,977	99,973	576,950	Aug.	255,831	60,147	315,978
Mar.	575,012	111,355	686,367	Sept.	229,410	79,573	308,983
Apr.	585,789	116,910	702,699	Oct.	537,159	94,993	632,152
May	545,001	114,995	659,996	Nov.	267,829	53,968	321,797
June	554,878	119,544	674,422	Dec.	475,382	72,669	548,051

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

Year	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	..
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954	25,071	35,576	945	61,593	48,279	9,519
1955	5,001	33,387	1,001	39,389	35,900	6,833
1956	3,100	32,358	1,040	36,498	34,405	6,109
1957	3,046	35,687	1,076	39,806	39,774	80,077
1958	2,678	37,872	870	41,420	41,266	8,602
1959	3,624	41,522	891	46,037	46,059	10,536
1959:						
Mar.	339	4,013	83	4,435	4,459	7,629
Apr.	389	3,474	66	3,928	3,380	7,219
May	363	2,853	59	3,275	2,752	6,849
June	392	3,421	59	3,872	3,683	7,000
July	317	3,564	66	3,948	4,345	7,560
Aug.	210	3,306	77	3,592	3,716	7,848
Sept.	347	3,258	88	3,693	4,065	8,334
Oct.	265	3,571	79	3,915	4,391	9,088
Nov.	163	2,867	67	3,097	3,756	9,918
Dec.	240	2,793	102	3,135	3,612	10,536

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins: Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	All Other Vinyl Resins: Adhesives	All Other Uses	Grand Total
1953	63,691	62,385	129,215	52,353	22,152	22,823	27,790	22,411	77,478	480,299
1954	69,943	56,588	147,284	49,546	34,890	23,676	35,148	26,609	74,090	517,773
1955	83,276	51,424	183,736	64,223	56,357	27,439	53,868	31,853	105,644	657,821
1956	78,063	55,598	206,726	62,931	65,384	28,522	71,859	36,565	115,151	720,799
1957	90,543	56,344	216,517	66,392	81,357	31,519	50,637	41,665	113,396	748,370
1958	72,404	67,594	214,701	63,050	113,583	28,913	68,307	52,904	117,752	801,208
1959	85,136	125,639	304,711	64,703	151,840	31,371	94,418	57,599	159,528	1,074,945
1959:										
Apr.	7,526	10,390	27,226	5,951	14,096	3,038	8,376	5,182	15,282	97,067
May	6,765	10,664	25,561	6,466	13,762	2,583	7,614	4,662	13,972	92,049
June	7,517	11,227	24,711	6,231	12,073	2,625	8,447	5,022	14,783	92,636
July	6,545	9,329	22,645	5,263	12,156	2,850	7,340	4,853	13,284	84,265
Aug.	7,074	10,750	25,069	5,683	12,867	2,602	7,940	4,915	12,379	89,279
Sept.	7,112	11,275	28,106	6,387	11,939	2,904	7,644	5,167	11,540	92,074
Oct.	8,638	12,604	30,838	4,898	14,212	2,927	8,615	5,716	13,422	101,870
Nov.	7,962	11,598	26,409	3,968	12,801	2,095	7,242	4,786	13,145	90,006
Dec.	7,360	11,923	22,604	4,151	11,482	2,443	9,886	4,705	12,215	86,769

Source: Chemical Division, U. S. Tariff Commission.

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101	"	for butyl, black
57	"	for butyl, nonblack
50	"	for polysulfide, black and nonblack
36	"	for reclaim (all black compounds)
45	"	for Hypalon, black and nonblack
86	"	for silicone rubber, black and nonblack
92	"	for vinyls (all nonblack compounds)
100	"	for miscellaneous other rubbers, black and nonblack
156	"	for blends of general purpose rubbers (natural, styrene, butyl, reclaim), black
71	"	for blends of general purpose rubbers, nonblack
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Various Compounding Materials Consumed by the Rubber Industry

Material	1951	1952	1953	1954	1955	1956	1957
Antimony, Primary							
Short tons	19c	66c	20c	49c	78	156	284
% of total	.001	.004	.001	.004	.006	.010	.024
Asphalt: [a]							
Short tons	21,414	33,288	.....	.....	.. ..	.....	.....
% of total	0.3	0.4	.....	.....	.....	.....	.....
Barite (Barytes):							
Short tons	15,000	18,000	21,000	20,000	25,104	22,101	21,782
% of total	2.13	2.0	2.0	2.0	2.0	2.0	1.0
Carbon Black:							
Short tons	530,614	537,273	566,797	511,813	643,430	622,325	635,781
% of total	93.9	93.1	94.4	93.5	93.5	95.5	95.5
Clay, Kaolin:							
Short tons	231,331	240,982	241,052	247,431	257,223	268,157	301,185
% of total	12.7	13.2	12.8	13.2	11.9	12.0	14.0
Clay, Fire & Stoneware:							
Short tons	.....	9,322	18,475	8,781	2,928	.....	.....
% of total	.....	0.1	.2	.1	.2	.....	.....
Lime:							
Short tons	1,126	2,000	1,631	1,555	1,465	2,487	2,799
% of total	(d)	(d)	(d)	(d)	(d)	(d)	(d)
Litharge:							
Short tons	2,641	2,109	2,230	1,768	1,947	2,266	1,898
% of total	1.1	1.5	1.4	1.3	1.3	1.7	1.7
Lithopone:							
Short tons	3,295	1,523	1,723	1,701	2,163	2,000[e]	....
% of total	3.2	2.5	3.3	3.9	5.0	5.0	....
Mica, Ground:							
Short tons	6,551	5,126	5,668	5,021	7,339	7,021	8,579
% of total	9.0	7.0	7.8	6.3	6.9	8.0	9.0
Sulfur:							
Short tons	84,000	84,000	89,600	84,000	89,600	89,600	89,600[e]
% of total	1.4	1.4	1.4	1.3	1.2	1.1	1.1
Talc: [b]							
Short tons	70,970	64,476	61,408	58,139	38,309	30,253	28,532
% of total	11.2	10.9	10.0	9.7	5.4	5.0	6.0
Zinc Oxide:							
Short tons	71,507	72,774	78,439	71,058	86,677	80,459	81,745
% of total	48.4	51.2	52.7	50.7	51.5	51.9	54.0

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Reclaimed Rubber
(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	New Supply	Consumption: Tons	Consumption: % to Crude [a]	Exports	Stocks On Hand at End of Period
1941	274,202	251,231	32.2	13,851	41,750
1942	286,00/ [b]	254,820	64.6	30,405	42,532
1943	304,058 [c]	291,082	59.6	15,678	46,201
1944	260,631 [d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	26.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1955	326,649	312,781	20.4	13,988	31,498
1956	287,220	270,547	18.8	13,832	34,969
1957	271,647	267,352	18.2	13,021	29,323
1958	259,809	248,156	18.2	11,362	29,063
1958:					
Sept.	22,641	21,771	17.7	1,005	26,676
Oct.	26,554	23,563	17.2	1,028	27,340
Nov.	22,450	21,271	17.4	1,051	27,680
Dec.	24,830	23,285	17.5	841	29,063
1959:					
Jan.	25,790	25,002	17.9	1,157	27,157
Feb.	25,290	24,471	18.2	1,041	27,504
Mar.	29,327	27,869	18.8	1,375	27,582
Apr.	21,672	22,380	18.5	1,225	25,131
May	19,441	20,496	18.1	980	23,554
June	26,169	24,998	17.9	1,054	23,448
July	27,884	23,942	16.9	1,236	25,949
Aug.	25,276	22,914	16.6	879	26,165
Sept.	28,130	25,137	17.2	937	27,384
Oct.	28,255	26,022	17.6	964	27,393

Source: U. S. Department of Commerce.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Production: Rayon Tire Cord Net Woven	Rayon Tire Cord Woven	Cotton and Nylon Cord & Fabric [a]	Chafer Fabrics (all fibers)	Total Tire Cord and Fabric	Stocks [b]: Cotton and Nylon Cord & Fabric	Rayon Cord and Fabric
1958:							
Jan.-Mar.	8,372	56,522	25,647	7,367	92,924	11,255	33,913
Apr.-June	.....	.....	30,745	6,020	80,533	11,274	26,327
July-Sept.	.....	.....	31,371	6,467	91,984	11,229	26,428
Oct.-Dec.	.....	.....	34,858	8,466	107,532	12,251	25,936
Total	8,372	56,522	122,621	28,320	372,973	46,009	112,604
1959:							
Jan.-Mar.	77,307	77,307	41,565	9,163	122,661	14,025	22,093
Apr.-June	76,265	76,265	37,102	7,699	116,965	16,811	31,094
July-Sept.	76,671	76,671	39,863	8,318	119,748	14,040	35,152
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1953	1954	1955	1956	1957	1958	1959
Jan.	89,634	89,634	96,397	100,642	109,295	107,281	114,720
Feb.	86,458	86,206	88,464	98,088	96,694	95,516	99,759
Mar.	98,158	101,549	105,684	112,412	113,166	108,914	118,995
Apr.	102,044	103,866	111,116	113,034	115,820	118,477	124,917
May	105,918	104,418	115,707	123,560	124,325	125,137	127,049
June	114,703	113,037	120,710	126,833	121,598	125,444	133,695
July	112,969	112,231	115,653	120,708	130,251	130,903	137,141
Aug.	109,124	110,223	121,816	125,847	128,808	129,925	132,875
Sept.	106,158	104,706	113,379	111,574	113,567	120,389	130,264
Oct.	106,037	105,607	112,558	119,204	119,334	125,097	120,858
Nov.	99,210	102,393	109,212	112,113	107,705	110,587	116,056
Dec.	100,225	104,258	111,034	108,096	112,691	120,305	.....
Total	1,230,629	1,238,346	1,321,730	1,372,116	1,393,254	1,417,975	

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Guttas: Tons	Gutta-Percha & Other Guttas: Value
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1954	949	504,065	2,196	2,624,926	417	511,055
1955	1,022	967,369	1,679	1,731,821	284	318,115
1956	1,396	1,111,165	1,851	1,909,447	290	309,615
1957	1,037	670,821	1,680	1,942,067	230	270,487
1958	745	536,820	1,501	1,698,840	157	224,499
1959:						
May	90	65,771	115	144,934	51	53,364
June	69	28,122	68	85,116	37	42,085
July	82	76,165	113	107,280	28	34,629
Aug.	54	23,923	123	139,588	40	39,254
Sept.	256	215,453	91	107,626	10	17,230
Oct.	188	254,838	107	187,721	16	13,020
Nov.	254	204,360	27	28,997	20	20,932

Source: U. S. Department of Commerce.

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All Classified Advertising must be paid in advance except for advertisers on contract. Send check with copy.
Replies to keyed advertisements will be forwarded via ordinary mail to advertiser without charge.

Address all replies to Box Numbers care of RUBBER AGE, 101 West 31st St., New York 1, N. Y.

Copy for April 1960, issue must be received by Friday, March 25

POSITIONS WANTED

CHEMIST AND ENGINEERING TECHNOLOGIST—B.S.—Ph.D. level. Long experience in rubber, latex, resins, plastics and related materials. Pressure sensitive development and manufacture. Chemical development, engineering and mechanical experience. Administrative and consulting experience. Patents registered. Mature age. Full time connection or consulting basis considered. Eastern location preferred. Address Box R-486-P, RUBBER AGE.

PRODUCT MANAGER, EXECUTIVE SALES. Silicone rubber specialist. 12 years in management, sales engineering, product development, cost estimating, cost reduction. Compounding and expert bonding knowledge. Familiar with most other elastomers. Chemical and metallurgical education and background. Recently involved with many missle applications. Experience in flexible and rigid waveguide plumbing manufacture. Excellent nation-wide customer relations with aircraft and missles industry. Want challenging opportunity, travel. Prefer West Coast location. Address Box R-503-P, RUBBER AGE.

TECHNICAL SALES and or service to the rubber, plastics and allied industries. Experience includes technical service, sales, as well as compounding, development and manufacturing. Address Box R-504-P, RUBBER AGE.

RUBBER TECHNOLOGIST desires responsible position. Eighteen years experience in overall operations. Background includes compounding, development, production, cost estimating, management. Address Box R-505-P, RUBBER AGE.

MARKET DEVELOPMENT and SERVICE ENGINEER. Technical graduate, age 29, good background in industrial products and tire manufacture. Four years experience in product design, application and service engineering. Desires position which will lead to technical sales. Resume on request. Address Box R-512-P, RUBBER AGE.

LATEX EXECUTIVE skilled in management techniques. Recognized top-notch formulator. Mature, aggressive. Seeking management position in sales, R&D, or manufacturing. Address Box R-517-P, RUBBER AGE.

HELP WANTED

CHIEF CHEMIST—COMPOUNDER
Rapidly expanding precision molded goods manufacturer wants chief chemist with experience in high temperature fuel and oil resistant stocks. Address Box R-500-W, RUBBER AGE.

PRODUCT DEVELOPMENT
Rubber and plastics. Chemist or chemical engineering graduate. Some rubber experience necessary. Opportunity for widely varied individual creative work. Send resumé and salary desired to: E. L. BIXBY, GOODALL RUBBER COMPANY, Trenton 4, N. J.

RUBBER CHEMIST
Long established rubber reclaiming company has opening for rubber chemist. This is an excellent opportunity created by promotion. Experience in general compounding and/or processing for product development desirable but not essential. Pension, hospitalization and other benefit programs above average. Salary commensurate with experience. Send resumé in confidence. Address Box R-507-W, RUBBER AGE.

SUPPLIERS

Your advertising in RUBBER RED BOOK enables you to provide additional information about your products . . . services . . . equipment just at that time when the buyer is looking for sources of supply.

See Pages 945 and 993 for details on the 1960 RUBBER RED BOOK

HELP WANTED—Continued

SENIOR RESEARCH CHEMIST
Challenging opening on San Francisco peninsula. Degree in Chemistry or Chemical Engineering. Five to ten years experience in rubber compounding and production. Record of development in precision molded rubber products. Salary open. Liberal benefits. Replies confidential. Send resumé. Address Box R-510-W, RUBBER AGE.

MATERIALS & PROCESS RESEARCH CHEMISTS
Research minded, medium-sized company, long recognized as the leader in its field, offers positions in its expanding materials and process research department. Background experience in all elastomer compounding and development, including polyurethanes, and/or rubber-metal bonding desirable. Chemistry or chemical engineering education required as well as ability to write reports and instruct others. Modern plant located in progressive community. New laboratories with excellent research facilities. Excellent housing available within 10 minutes driving distance. Call collect or write for application form.
LORD MANUFACTURING COMPANY
Personnel Department
Erie, Pennsylvania

PERSONNEL CONSULTANT
specialized in rubber & component materials
Production—Sales—Chemists—Engineers
—Technical Representatives—Marketing—
Product Development—Process Supervisors
Discuss your problems with
Clem D. Easly, Special Consultant
CADILLAC ASSOCIATES, INC.
29 E. Madison Bldg., Chicago 2, Ill., FI 6-9400
Call, write or wire—in confidence

CHEMISTS — CHEMICAL ENGINEERS
ADMINISTRATIVE — TECHNICAL
Our National, Confidential Service
invites your investigation!
TOP CHEMICAL POSITIONS AT ALL LEVELS.
Call, write, or wire:—GLADYS HUNTING (Consultant)
DRAKE PERSONNEL, INC.
29 East Madison Building, Chicago 2, Ill.
FInancial 6-8700

EXECUTIVE TECHNICAL SALES OFFICE
Nelson EMPLOYMENT SERVICE
specialist for the "Rubber Industry"
HAROLD NELSON — 600 FIRST NATIONAL TOWER
PHONE: FRANKLIN 6-6861 — AKRON 8, OHIO

REMEMBER to show the box number on the envelope when writing to classified advertisers—that's the only way we can identify the advertiser to whom you are writing.
Address your letters to—

Box Number (show number)
c/o RUBBER AGE
101 West 31st Street
New York 1, N. Y.

"Help Wanted" continued on next page

HELP WANTED—Continued

MAINTENANCE MAN. Well established Eastern rubber company has opening for maintenance man. Must have knowledge of rubber machinery, mold repair and construction. Give full information and salary required. Address Box R-511-W, RUBBER AGE.

RUBBER HOSE COMPOUNDER AND DEVELOPMENT ENGINEER
A large eastern manufacturer of hose has an opening for a man experienced in rubber compounding and also an opening for a man experienced in factory processing and development of hose. Submit detailed resume to Personnel Manager, ELECTRIC HOSE & RUBBER COMPANY, Wilmington 99, Delaware.

COMPOUNDER. Well-known mid-western mechanica[1] goods manufacturer desires rubber extrusion compounder with 3 to 5 years experience. Knowledge of vinyl extrusion compounding desirable but not essential. Please send resume and salary requirements in first letter. Address Box R-513-W, RUBBER AGE.

PLANT SUPERINTENDENT
Midwest rubber company needs man familiar with compounding, open milling, calendering and extruding. Supervisory experience desriable. Growth opportunity with expanding company. Address Box R-514-W, RUBBER AGE.

RUBBER MOLD ENGINEER
Large Eastern precision molder of rubber and plastics has opening for an experienced rubber mold engineer with project experience and ability to estimate, design and develop. Salary open, growth potential, attractive surroundings. Send resume in strict confidence. Address Box R-516-P, RUBBER AGE.

TECHNICAL SALES—ISOCYANATES
Young Ch.E. or chemist wanted for field sales work requiring some understanding of rubber and plastic technology. Training and introductory period will lead directly to self supervising field selling. We require integrity, intelligence and energy in that order, and offer a permanent position with growth potential. Starting salary $6500 to $9000 for two to five years experience. Please send resume to: Richard Kithil, Vice President, THE CARWIN COMPANY, North Haven, Connecticut.

RUBBER DEVELOPMENT TECHNOLOGIST
Rubber technologist with compounding and physical testing experience to work in rubber laboratory engaged in technical service research and development. Work is directed toward the use of zinc oxide in synthetic and natural rubber products. Lab is well equipped with modern compounding, electronic and physical testing equipment. Progressive management encourages original work and professional development. Salary commensurate with training and experience. Write:

Robert G. Redelfs, Technical Coordinator
ST. JOSEPH LEAD COMPANY
P. O. Box 97 Monaca, Pennsylvania

opportunities in
LATEX SALES

To handle direct sales of butyl latices to paper, textile and rubber industries. Latex compounding and application background essential. Applicants should be sales oriented. Technical degree is preferred. Immediate openings available in several sales locations. Send complete resume.

ENJAY

Enjay Company, Inc.
Personnel Division—Room 1300 A
15 W. 51st St., New York 19, N. Y.

SUPPLIERS:

The detailed product information you incorporate in your RUBBER RED BOOK advertising may be the difference between keeping an old account or losing it . . . between getting a new account or losing out.

See Pages 945 and 993 for details on the 1960 RUBBER RED BOOK.

BUSINESS OPPORTUNITIES

SMALL RUBBER MANUFACTURING PLANT for sale by owner. Established 1937. Equipped for making molded rubber items. $28,800 for land, buildings, equipment. 349 feet of property adjoins both street and railroad. Park-like grounds ample for plant expansion and parking. Located 8 miles from downtown Omaha. Terms $6,800 down and $237 per month to responsible buyer. Phone, wire or write: UNION RUBBER WORKS, Box 22, Ralston, Nebraska. Orchard 3090. Evenings or Sunday, Orchard 7156.

ACQUISITION WANTED

We Are Interested In The
Acquisition Of A Manufacturer Making
INDUSTRIAL RUBBER GOODS
Prefer
SALES OVER ONE MILLION
Write
BOX R-515-B RUBBER AGE

RUBBER FACTORY WANTED

Midwestern Rubber Factory intends to extend its manufacturing in the East, and is interested in a rubber plant in the Eastern area. Transaction may be outright purchase or controlling interest. Our main products are mechanical, printing and molded rollers. In reply, state equipment, number of personnel, types of products produced, floor area, room for expansion and any other pertinent information which will be held in strict confidence.

Address Box R-518-B, Rubber Age

MIXING
To Your Specification
K. B. C. INDUSTRIES, INC. NEW HAVEN, CONN.
881 State St. Tel: State 7-8662
Otto J. Lang, General Manager

CUSTOM RUBBER MIXING WANTED
Have Banbury capacity for either sponge or dense. Our years of experience are your assurance of quality.
BROWN RUBBER CO., INC.
P. O. Box 1000, Lafayette, Indiana
Phone: Gibson 7-2121

PELMOR CUSTOM MIXING
Meticulous supervision • Close laboratory control
Precise compounding • Uniform quality
Facilities for every requirement
PELMOR LABORATORIES, Inc.
NEWTOWN, PENNSYLVANIA
WOrth 8-3334

Avoid Unnecessary Capital Investment

MAKE BURTON YOUR CUSTOM-MIXING DEPARTMENT

BURTON'S exacting standards of quality and uniformity insure that your compound will be mixed as carefully as you would do it yourself.

Selecting from our inventory of 190 rubber, pigment and chemical ingredients, or from your stock of raw material, BURTON will custom mix both black and colored stock...and deliver on short notice.

Our laboratory, supervised by a graduate chemical engineer with many years experience in rubber compounding assures uniform quality in Tensile Strength, modulus, Elongation, Hardness, Mooney Scorch and Plasticity.

"MIKE THE MIXER" is the symbol of *Quality Custom Compounding and Mixing.*

TM Reg. Pend.

For technical consultation at no obligation attach this ad to your letterhead and mail to:

BURTON RUBBER PROCESSING INC.

Middlefield Road Burton, Ohio TEmple 4-8850

30 Miles Northeast of Akron

FOR PEQUANOC

CUSTOM COMPOUNDS

CALL

AMERICAN HARD RUBBER

All the know-how of the former Pequanoc Rubber Company *plus* one hundred and eight years of rubber processing experience behind American Hard Rubber Company.

- Expert compounding and milling of all grades of soft and hard rubber.
- Top technical assistance.
- High quality, uniform, controlled mixing.

AMERICAN HARD RUBBER COMPANY

Sales Division: Ace Road, Butler, N.J.
Phone: Butler 9-1000
Plants: Tallapoosa, Ga.; Butler, N.J.

CORK

GRANULATED TO SPECIFICATIONS

MARYLAND CORK COMPANY, INC.

414 Meyerhoff Bldg. Charles & Saratoga Sts.
Baltimore 1, Maryland

Directory of CONSULTANTS

SOUTH FLORIDA TEST SERVICE, INC.
(Established 1931)

Corrosion, weathering and sunlight tests. Four locations in Southern Florida for inland, salt atmospheric, tidewater and total immersion exposure tests.
4301 N. W. 7th St., Miami 44, Florida

BLACK

Master Batching
Mixing of all kinds

BESTREAD PRODUCTS CO. STOUGHTON, MASS.

HALE AND KULLGREN

Specialists in Process and Plants for Rubber and Plastics
A Complete Engineering Service including: Economic Surveys; Process Design; Installation; Contracting and Operation.

BLAW-KNOX COMPANY
Aetna Standard Division
613 E. Tallmadge Ave., Akron 10, Ohio, FRanklin 6-7161

SINCE 1880 RUBBER GOODS

Rand REG. U. S. PAT. OFF.

"They Last Longer" REG. U. S. PAT. OFF.

DRESS SHIELDS
DRESS SHIELD LININGS
BABY PANTS
BABY BIBS & APRONS
SANITARY WEAR
RUBBERIZED SHEETING
RUBBER APRONS
STOCKINET SHEETS
RUBBER SHEETS
RAINCAPES & COATS
RUBBER SPECIALTIES
VINYL PLASTIC SHEETING
RUBBER DAM & BANDAGES — SHEET GUM

RAND RUBBER CO. BROOKLYN, N. Y. U. S. A. MFRS.

Pure Food and Drug Additives Law
Testing and Data

GIDLEY LABORATORIES, INC.
Fairhaven, Massachusetts

FLEXO JOINTS

THE STANDARD FOR SAFETY

- Proved in years of efficient service, FLEXO JOINTS offer the flexibility of hose — the strength of pipe — the ideal steam connection for presses, tire molds, etc.

Four styles, for standard pipe sizes ¼" to 3".

- Write for information and prices.

FLEXO SUPPLY CO., INC., 4662 Page Blvd., St. Louis 13, Mo. S. A. ARMSTRONG, LTD. In Canada: 1400 O'Connor Dr., Toronto 13, Ont.

SUPPLIERS:

Ask for the order!

Do it in advertising space in the 1960

Rubber
RED BOOK
Directory of the Rubber Industry

At the same time, give buyers reasons why you should get the order. Tell them about—

Properties
Types
Packaging Styles
Telephone Numbers
Warehouse Locations
Local Offices & Agents
Products

See Pages 945 and 993 for details.

COLORS FOR RUBBER-VINYLS

FINELY PULVERIZED, BRILLIANT

Midwest: FRED L. BROOKE CO.,
P. O. Box 463, Oak Park, Ill.

Pacific Coast: ERWIN GERHARD
465 California St., San Francisco 4, Calif.

PALMER SUPPLIES CO.
2281 Scranton Rd., Cleveland
800 Broadway, Cincinnati
211 E. Robinson Ave., Orlando, Fla.

BROOKLYN
COLOR WORKS, INC.
MORGAN AND NORMAN AVENUES, BROOKLYN 22, N. Y.

Choose MOLD LUBRICANTS with Care

for precision work • for quality • for clean release

We have over 25 varieties of Mold Lubricants, Silicone Oils, Emulsions, Polyethylene Emulsions, and non-Silicones, which are being used by rubber and plastic manufacturers throughout the world.

All Samples Now Packed In Pressure Pak Cans
For Your Convenience In Testing.
BLACK CELLULOSE FLOCK FOR SALE
For Complete Technical Data & Prices
Write or Phone:

STONER'S INK CO.
Quarryville, Pennsylvania STerling 6-2745

GUMMI UND ASBEST—PLASTISCHE MASSEN
(Rubber & Asbestos-Plastics)

The international monthly journal of the rubber, asbestos and plastics industries.

Articles in German, English and French
Is regularly read in more than 50 countries
and is the Advertising Medium
for all firms interested in export.

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Specimen copy and advertising rates on application to the publishers.

A. W. Gentner-Verlag, Stuttgart / Germany
P. O. Box 668

EQUIPMENT FOR SALE

FOR SALE: 43—Baker-Perkins #17, 200 gal. jacketed mixers, sigma or duplex blades, individual 30 HP motors, drives, power screw tilts. 2—Baker-Perkins 100 gal., sigma or dispersion blades, jacketed, hydraulic tilts. 2—Day 35 gal. sigma blades. Prices are lower than ever before—Phone or wire collect for details. PERRY EQUIPMENT CORP., 1409 N. 6th St., Philadelphia 22, Pennsylvania.

MUST LIQUIDATE EQUIPMENT
PRICE IS NO OBJECT!

Modern F-B 2-roll mills—14″ x 30″, 16″ x 42″, 22″ x 60″
3-roll calender, 22″ x 58″
Latex pouring curing line
Truck dryers, 30″ and 100′
Adamson vulcanizers, 6′ x 16′
Baker-Perkins mixers to 300 gallons
Banbury laboratory size B mixer
2 Stokes vacuum impregnators
Stokes automatic molding presses
Southwark, Dunning & Boschert & French Oil Mill hydraulic presses
Extruders: Royle No. 1, Allen 2″, MPM 4½″, and MPM 1½″
Utility stock cutter, 9″ wide
Send for complete list.

FIRST MACHINERY CORP.
209 Tenth Street, Brooklyn 15, N. Y.
ST 8-4672 Cable: "Effemey"

FOR SALE

1—22″ x 60″ Farrel-Birmingham 2 roll mill, 150 HP.
1—6″ x 12″ Adamson 3 roll lab calender, M. D.
1—32″ x 32″—2 opening hydraulic press, 16″ ram.
1—6″ x 16″ Thropp 2 roll mill.

CHEMICAL & PROCESS MACHINERY CORP.
52 9th Street Brooklyn 15, N. Y. Phone HY 9-7200

FOR SALE

Rebuilt 4-Roll Calenders

1—8" X 16" Inverted "L"
1—10" X 26" Inverted "L"
1—12" X 24" "L" Type

All breast rolls quick removable type. Drives on larger machines now incomplete; can be set up to suit requirement of roll speed and power, and could also be made into 3-roll machines.

STEWART BOLLING & CO., INC.
3190 E. 65th Street Cleveland 27, Ohio
Phone MIchigan 1-2850

ARMACO

We are one of the foremost specialists in supplying everything in used, reconditioned and new machinery for the Rubber and Plastics industries only.
NEW—Laboratory mills, hydraulic presses, extruders, bale cutters and vulcanizers. We are interested in purchasing your surplus machinery or complete plant.

AKRON RUBBER MACHINERY CO., INC.
200 South Forge St., Akron 9, Ohio, Phone HEmlock 4-9141

HOWE MACHINERY CO., INC.
30 Gregory Avenue Passaic, N. J.
DESIGNERS & BUILDERS
OF V BELT MANUFACTURING EQUIPMENT
Cord Latexing, expanding mandrels, automatic cutting, skiving, flipping and roll drive wrapping machines
ENGINEERING FACILITIES FOR SPECIAL EQUIPMENT
Call or Write

SOMETHING TO SELL?

Buyers in 1800 rubber plants read these pages regularly. Write today for rates on this space.

ALBERT and MACHINERY

are synonymous to the rubber industry

P. E. ALBERT & SON

21 Nottingham Way Trenton 3, New Jersey
Phone: EXport 4-7181

RUBBER EQUIPMENT

600 Ton Adamson Slab Side 8 Opening Hydraulic Press, 42″ x 42″ Platen, 26″ Chrome Plated Ram.
Erie 84″ Rubber Mill, Top Cap, Late Type. A Real Buy!
Adamson 6″ Rubber Tuber with strainer head.
Black Rock Guillotine Cutter With 14″ Knife.
Ball & Jewel #1 24″ Rotary Cutter, 15 h.p. motor drive.
24″ x 24″ Molding Presses with 12″, 14″, and 16″, Rams.
Vaughn 18″ x 40″ 4 Roll "L" Type Calender With Motor and Reduction Drive.
A Full Line Of Equipment For The Rubber Industry: Banbury Mixers, Tubers, Rubber Mills, Molding Presses, Die Cutting Presses, Accumulators, Vulcanizers, etc., etc. Write for brochure on our new 6″ x 13″ Rubber Lab Mill.

WE WILL FINANCE

JOHNSON MACHINERY CO.
683 Frelinghuysen Ave.
Newark 12, New Jersey
Bigelow 8-2500

What do you need? What do you have to sell?

Several 22 x 22 x 60″ mills, motor and drive, *new rolls, new conn. gears*
30″, 40″, 42″, 48″, 75″ mills, motor and drive.
42″ x 42″ Eemco Press, 24″ ram, 6 opening, all steel, immediate delivery.
3 roll 22″ x 68″ Birmingham calender, motor and drive.
#½, #1, #2, #3, Royle rubber extruders.
200 gallon cement churns, jacketed and unjacketed.
New 6″ x 13″ "Reliable" laboratory mills and calenders.
24″ x 24″ Presses, 16″ & 18″ ram, 18″ stroke, steel rampots.

Used machines are offered fully rebuilt and guaranteed.
Buying and selling.

Reliable
RUBBER & PLASTIC MACHINERY CO., INC.
2014 UNION TURNPIKE NORTH BERGEN, N. J.
PHONE: UNION 5-1073

NEW CONCEPT

in calender and mill frame construction — frames of fabricated steel weldments — lifetime guarantee — new machines built in any size

SPECIAL

24" x 72" Farrel 3 roll calender with drive.

Guaranteed

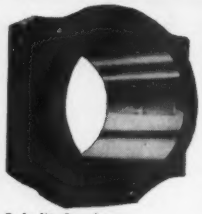
NEW · USED · REBUILT MACHINERY

21 SHERMAN ST. • WORCESTER, MASS.

DIVISION OF BOWMAN BROTHERS OF MASS., INC.

SHERMAN RUBBER MACHINERY CO.

HEAVY RUBBER & PLASTIC MACHINERY



Rebuilt Bearing . . .
Part of N.E.E. Service

Rebuilt
Installed
Repaired

Complete job done right in your plant. No supervision required. 30 years experience in servicing mills, mixers, calenders, tubers, etc.

Metal spraying jobs welcomed. Used equipment bought and sold.

WRITE — WIRE — PHONE TODAY

New England Engineering Co., Inc.
P.O. Box 465, Derby, Conn. REgent 5-6441

THE **DAILY** GUIDE

This is indispensable to buyers of Rubber

THE TRADE NEWS SERVICE

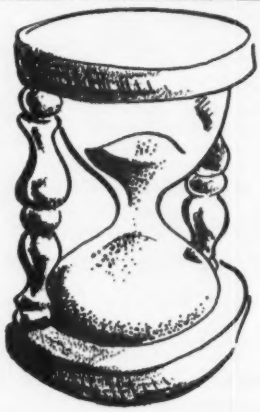
Established 1915

24 Stone St. New York 4, N. Y.

featuring

MARKET REPORTS • RUBBER IMPORTS • STATISTICS

Write for Free Trial Service



SUPPLIERS

1960

Rubber Red Book

Closes April 15,

Order Space Today!

See pages 945 & 993

BIRDS that Audubon never knew 'til now

Sad-Tailed Seller

Identifying Marks: Droop at the edges, clipped all around. Buys High, sells low. Always forgets to check the market for used equipment in the Classified Section of RUBBER AGE. Never did realize he could keep up with everything that's going on if he'd only read it every month.

Best Remedy: Two subscriptions to RUBBER AGE, one for him—at home, and the other for his Number 1 Boy so they'll both be well posted. The coupon below is all you need to order both.
Mail it now!

RUBBER AGE, 101 West 31st St., New York 1, N. Y. ..... (date)

Please enter .... subscriptions to RUBBER AGE, starting with the next issue, for:

☐ Three Years ☐ Two Years ☐ One Year

We understand that each subscription costs $10 for 3 years, $7.50 for 2 years, and $5 for one year (U. S. Rates). Send bill to: ☐ Company ☐ Each Person

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Company .....
Home Address .....
City ..... Zone .... State .....

Name ..... Title .....
Company .....
Home Address .....
City ..... Zone .... State .....

360

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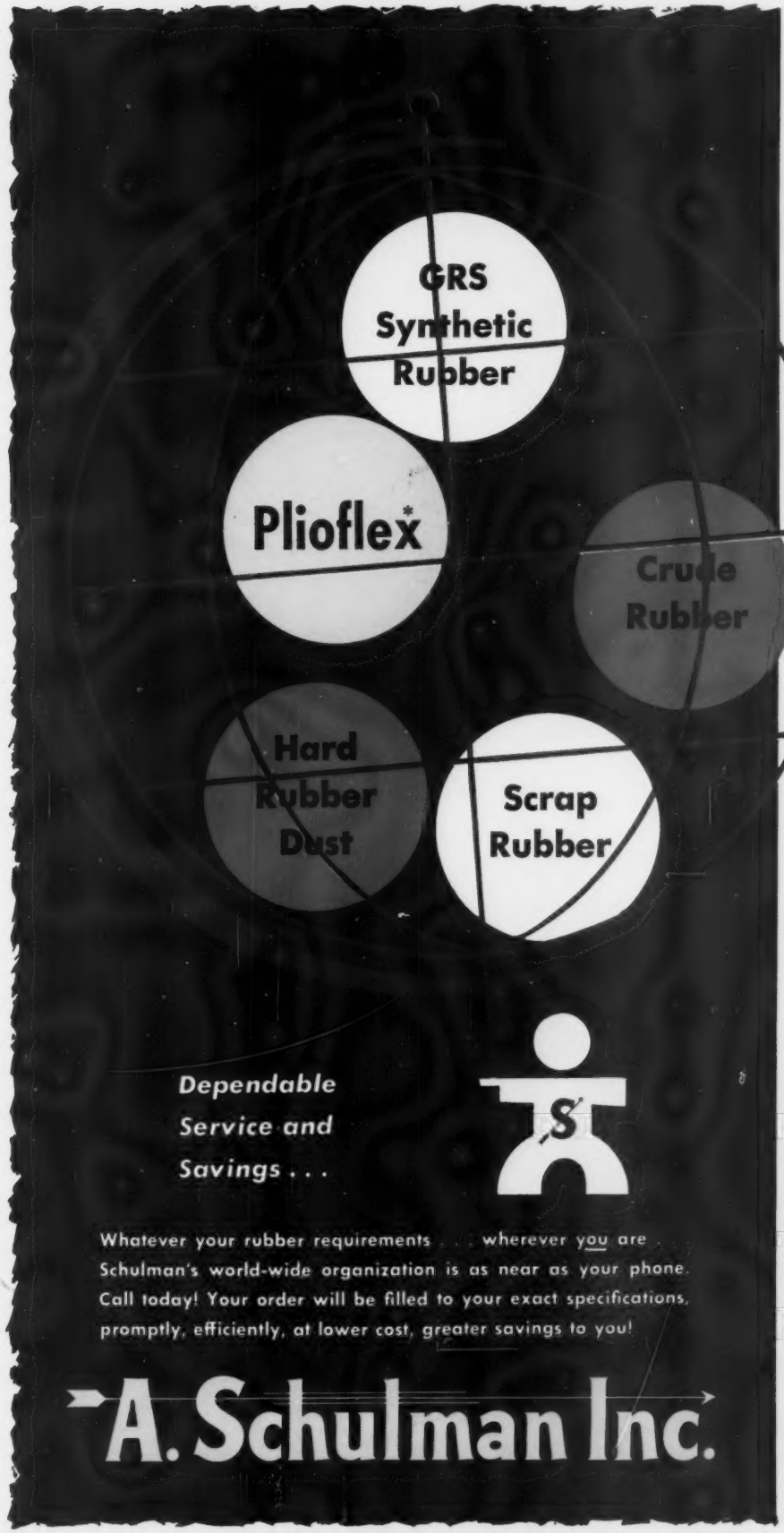

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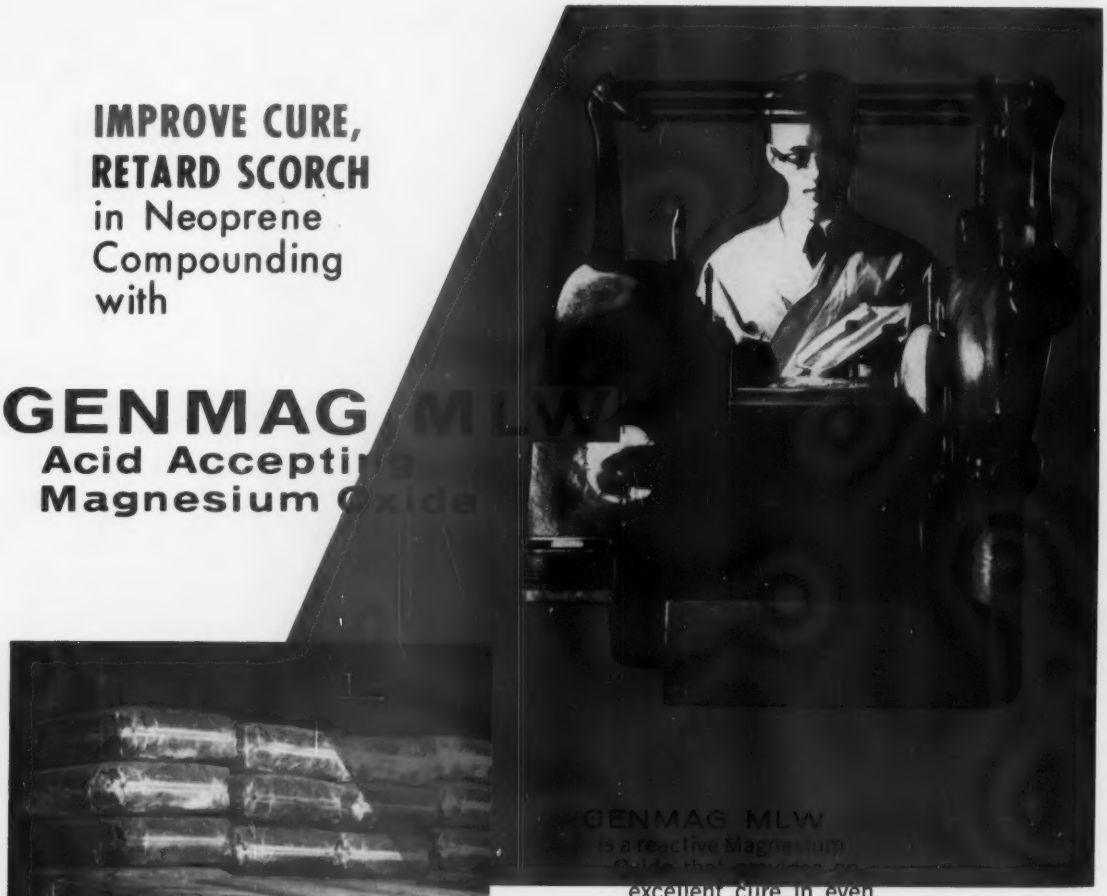

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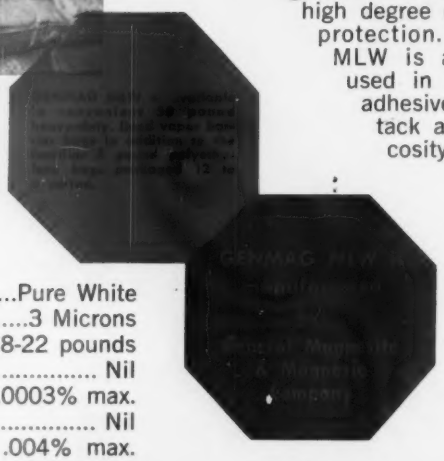

COLOR	Pure White
AVERAGE PARTICLE SIZE	3 Microns
BULK DENSITY	18-22 pounds
MOISTURE	Nil
COPPER	.0003% max.
CHLORIDES	Nil
MANGANESE	.004% max.
ACTIVITY	Moderate

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APRIL, 1960

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